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WILDLIFE IN NORTH CAROLINA

JANUARY 2001 $1.50

Urban Archaeology

by Jim Dean ©2001

The woods and fields are in winter dress these days, all the colors tastefully muted and matched in mostly shades of brown, ochre and gray with smears of mauve here and there in the grassy edges. Except where dense young pines have sprung up, adding a contrasting green, you can often look deep into the leafless woods. Sometimes, the land's contour—I started to say the original lay of the land, but that might not be true—reveals itself in appealing ways. In spring or summer, you could not have seen the folds and furrows that crease the brow of that hill, or that shining creek lined with sycamore and birch. It is a time of spare beauty, and it has always been my favorite time to drive country roads.

JIM DEAN

For years, I have sometimes played a game, imagining myself as a stylish pointer swiftly coursing the irregular edges of the fields, checking out the corners of soybean fields, circling abandoned homesteads and honeysuckle thickets, slipping through woodlots. On the roads I most frequently travel, there was once plenty of likely cover. Nowadays, my 55-mph bird dog is finding the going less toothsome. Miles sometimes pass without seeing a truly promising spot even on rural roads—the birdy habitat having given way to turned-under fields, close-cropped pastures, pine plantations, lawns, housing, small businesses. Then, of course, the increased traffic can be distracting—this old dog is not ready to meet his maker head-on because he wasn't watching where he was going.

Yet, old habits die hard, and when the pace is leisurely and the road clear, I still can't resist the charm of mid-winter's sere landscape. Instead of hunting, though, I more often look for evidence of what came before. I have become something of a mobile archaeologist, seeking the ruins of older civilizations—especially those I remember. There, up that rise through those woods, is what's left of an old road I drove 40 years ago, and there is other evidence of it here and there—old cut and crumbling pavement, an abandoned gas station—even though the road has long since been replaced by the modern highway I'm traveling. Farther along, I see a grove of ancient oaks, all that's left of a plantation that once dominated this area, yet it is doubtful that the young families who live on this same land in new houses know that it ever existed.

"Farther along, I see a grove of ancient oaks, all that's left of a plantation that once dominated this area..."

Sometimes, I have a pleasant surprise, like that winter day a few years ago when I was driving through Halifax County and realized that the highway paralleled an abandoned railroad. I came around a curve that seemed familiar. What had been here? I slowed and pulled off the road, trying to recall. I got out of the car and stood a moment. Just beyond the curve, the old rail bed—the tracks long gone—continued barely visible down a corridor of pines flanked by older hardwoods. Then, I smiled as I remembered. When I was 5 or 6 years old, my parents had stopped here to let me watch a steam locomotive fill its boiler with water. The massive water tank with its retractable spout had occupied a space between the road and rails. There was, of course, no trace of it now, but I could still picture the water pouring from the spout into a black engine belching steam and smoke.

I suppose this sentimental tendency is inherited. My grandfather bought the first piece of his Granville County farm shortly after the turn of the century. When I hunted with him as a teenager, he loved to show me an old road bed through the woods. Even half a century ago, you would not have guessed a road had ever been there unless someone pointed it out.

"When I was your age, I walked through here every day on the way back and forth to a one-room school, rain or shine," he told me. "Five miles, each way, so I knew this land pretty well by the time I was old enough to buy it."

I doubt that I am the only person who looks for old homes, barns, roads and similar touchstones. It is, after all, comfortable for those of us in mid-life to find something—sometimes anything—that has remained unchanged. And if our landmarks are plebeian, it is partly because we are still a relatively young nation. We don't live beside Greek and Roman ruins; Bronze Age Troy is not just down the street. But like those Mediterranean civilizations, we are richer when we save some of what came before and live in its midst.

Oh yes, one other thing. I once backtracked that faint schoolhouse path to see if my grandfather's 5-mile hike had been a reality or a cliché. It seemed more like 6 or 7 to me.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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The Rice Bird

written by Lawrence S. Earley
illustrated by David Williams

Wildlife most often manifest themselves to us in small ways. That's one reason that deer hunters voluntarily stay immobile for hours at a time in a tree stand. Having put on the cloak of silence, they can discover the secret stirrings of the life around them, the soft pattering of a fox on its hunt, the twittering of a gray squirrel.

Then there are the major wildlife events that impress themselves most forcefully on our imaginations—the great flocks of migratory waterfowl darkening the skies overhead, the urgent movements of caribou, and, once upon a time, the spectacle of millions upon millions of buffalo moving upon the vast western plains.

To this list don't forget to add the staggering flocks of migratory bobolinks that descended twice a year onto rice fields in southeastern North Carolina. Today, the bobolink, a member of the blackbird family, is mostly known for its singing—it pours forth "a perfect torrent of song," as Edward Howe Forbush described it—as well as for its distinctive plumage. The males sport a black face, tail, underside and outer wings; white shoulders and rump; and a splotch of bright yellow on the nape of its neck during the breeding season. Yet, a century ago bobolinks were to southeastern rice crops what locusts are to wheat crops—a scourge, a menace. Young boys and men whooped and hollered to keep the birds from laying waste to entire rice fields, which they frequently did. Indeed, shooting the birds became an acceptable and even a necessary pastime. In just a single year, 1912, a total of 720,000 bobolinks were shot and shipped from Georgetown, S.C., to market.

What few knew at the time was that the bobolink's depredations were driven by a powerful urge to fatten itself for one of the longest migrations undertaken by any migratory bird in North America. The bobolink winters in the great pampas of South America—in Argentina, Brazil and Paraguay—and breeds in the northern United States and southern Canada, a round trip of about 12,400 miles. The bird covers such an immense distance, it seems barely to have enough time to settle down before returning in the direction that it came. On its winter grounds, it begins to gather in flocks and stir northward in March, flying and feeding through the Southeast and arriving on its breeding grounds in May. By late August, after the rigors of the breeding season and its molt, it's on the move again, inexorably flocking south until arriving in South America in November.

The birds' migratory route down the East Coast carried them over the rice fields of the Southeast (see "Cape Fear Gold," p. 4), where they tarried to feed and where they earned the sobriquet "the rice bird." They were considered delectable table items, "esteemed in Carolina the greatest delicacy of all other birds," wrote explorer Mark Catesby in the early 1700s. "When they first arrive, they are lean; but, in a few days, become so excessively fat that they fly sluggishly, and with difficulty; and when shot, frequently break with the fall. They continue about three weeks, and retire by the time rice begins to harden."

Bobolink populations have expanded and contracted over the years. They are smaller today than they were a century ago, but not just because of the high toll the gunners took. Bobolinks are grassland birds, and ornithologists believe that their East Coast populations probably began to expand once forests were cleared and fields planted. These open areas created the grassy habitat the bird preferred. Shooting the rice birds probably had less of an effect on their populations than reforestation in abandoned agricultural fields over the last 50 years or so in the East. Too frequent mowing of grassland breeding grounds may also play a role in the bird's decline.

Boblinks normally don't breed in North Carolina, although researchers have discovered evidence of possible breeding in the Great Smoky Mountains. Their breeding habits are interesting. They form polygynous relationships—that is, the male may breed with several females. This may be why an extra adult, either a male or female, is often found feeding the three to seven young in the nest. In the case of males, the extra "helper bird" may well be responding to what it considers its own offspring. And tests have shown that it may well be right!

Other Reading

- Richard M. Degraaf, *Neotropical Migratory Birds: Natural History, Distribution, and Population Change* (Cornell University Press, 1995).
- Scott Weidensaul, *Living on the Wind: Across the Hemisphere With Migratory Birds* (North Point Press, 1999).

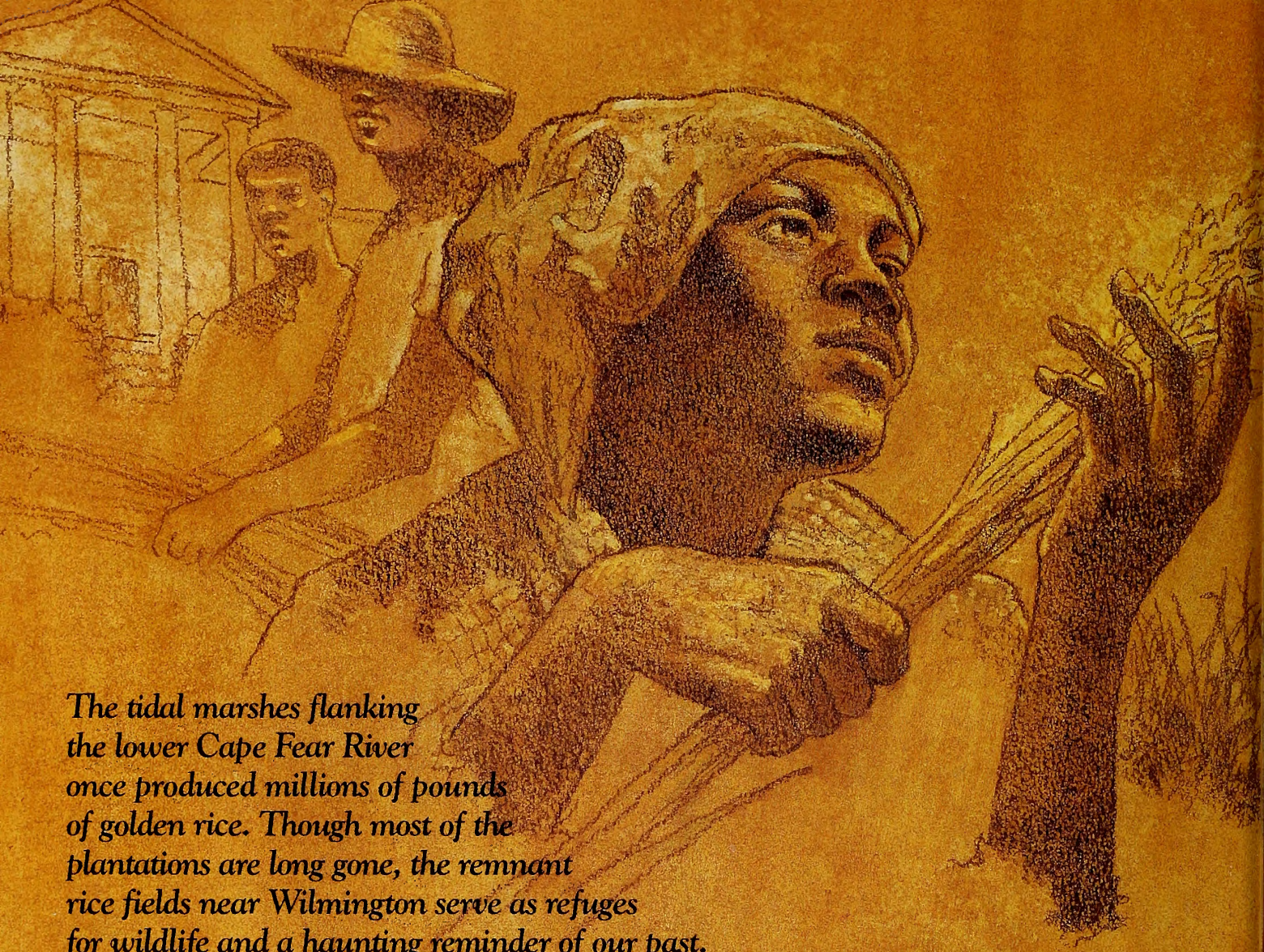
Surfing the Web

- For more information about the bobolink and its problems, see the Smithsonian Migratory Bird Center profile on the bobolink. *Address:* http://web2.si.edu/smbc/bom/bobo.htm
- For extensive information about the bird, including a U.S. range map and a population trend map, see the Breeding Bird Survey site for the bobolink. *Address:* http://www.mbr.nbs.gov/bbs/htmtr/h4940tr.html
- For information about the problems facing migratory birds, see the Smithsonian Migratory Bird Center site. *Address:* http://web2.si.edu/smbc/fxshts.htm

Bobolinks make a phenomenal round-trip *journey of more than 12,000 miles, which means they spend most of their time moving back and forth between their breeding grounds and winter grounds. Large, migrating flocks of bobolinks move through North and South Carolina in spring and fall. Once known as "rice birds," they fattened up for their strenuous journey by feeding at and sometimes devastating coastal rice plantations.*

After their journey south, bobolinks spend the winter *in the grasslands of southwestern Brazil, Paraguay and northern Argentina where they are increasingly considered as pests and shot. On their breeding grounds, bobolinks face shrinking grassland habitat as reforestation occurs.*

After spending nine weeks on their breeding *grounds in southern Canada and the northern United States (1), bobolinks begin migrating in late August, hugging the Atlantic coast (2) and hop-skipping across the Caribbean islands (3) before reaching South America (4) in October. They finally gain their winter grounds below the Equator two months later (5). By early March, the birds are on the move northward once again.*



The tidal marshes flanking the lower Cape Fear River once produced millions of pounds of golden rice. Though most of the plantations are long gone, the remnant rice fields near Wilmington serve as refuges for wildlife and a haunting reminder of our past.

CAPE FEAR GOLD

written by Rodney Foushee / illustrated by David Williams ©2001

"THEY USED TO GROW RICE HERE, SURE ENOUGH," Bruce Watkins says, as he eases the 17-foot canoe into the muddied waters of Town Creek. I pause briefly to survey the expansive sea of marsh grass, where waves of golden rice once grew.

Time wavers like the breeze-driven grasses as we glide downstream this pleasant October afternoon toward Town Creek's junction with the Cape Fear. Rice fields—long abandoned and choked with a myriad of tall, yellowing grasses including saw grass, cattail, giant cordgrass and phragmites—flank both sides of the twisting creek. These are the remnants of Pleasant Oaks, one of nearly 30 rice plantations that lined the lower Cape Fear River and its tributaries (see map) and once churned out millions of pounds of rice. Today, save Bruce and me, there is no sign of human life in this wild, forgotten place.

A red-winged blackbird lights in a tall stand of cordgrass and begins its gurgling song, oblivious to our intrusion. The blackbird, come nightfall, will be joined by a wave of warblers that will descend on the fields to rest before continuing their southward migration.

bird minding

North West Cape Fear River
North East Cape Fear River
MAGNOLIA
AUBURN
DALLISON
MULBERRY
PROSPECT
SCHAWFIELD
COBHAM
THE BLUFFS
ROSE HILL
ROCK HILL
FAIRFIELDS
SANS SOUCI
HILTON
WILMINGTON
Eagles Island
BELVIDERE
BELLVILLE
BUCHOI
flooding fields
THE FORKS
Town Creek
SPRING GARDEN
DOBBS
CLARENDON
WATERS
HULLFIELD
OLD TOWN
DALRYMPLE
PLEASANT OAKS
LILLIPUT
KENDALL
ORTON
reaping rice
CAPE FEAR RIVER
hand threshing
SOUTHPORT

RODNEY FOUSHEE

Ancient wood, *installed to support a floodgate on Town Creek, now stands as a haunting reminder of the past when dozens of rice plantations once lined the lower Cape Fear River and its tributaries (see map, previous page).*

"That's a 'gator wallow there," my guide says, motioning to a flat, recently disturbed area in the marsh along the muddy bank. "It's a small one," Bruce adds, as I strain vainly to spy the prehistoric reptile. "A big 'gator knocks down all the grass along the bank." A few hundred yards later, it becomes clear what Bruce is talking about. An area of marsh grass a good 10 feet wide and 20 feet long has been violently cleared out—knocked down by the powerful thrashings of a large alligator's tail and head.

Watkins, a protection specialist with the North Carolina Coastal Land Trust, has been working hard with concerned landowners to save this forgotten place for wildlife with easements against development. And with nearby Wilmington bursting at the seams, the upland stretches of large, undeveloped waterfront tracts like this one are a developer's dream. "I could show you the plans for a golf course for this very place," Bruce says.

So far, the trust has managed to conserve 4,000 acres of former plantation lands along Town Creek, including Pleasant Oaks. And the trust's plans are much bigger: to preserve a wildlife corridor from the mouth of the Cape Fear River up Town Creek and into the Green Swamp in the middle of Brunswick County. "This is a priority area," Watkins says. "How many places in North Carolina can you float down that look the same as they did in the 1600s? You can do that here on Town Creek."

THE RAISED BANKS WHERE THE ALLIGATORS HAVE MADE THEIR WALLOWS ARE THE REMAINS OF THE RICE DIKES, WHICH WERE HEAPED UP FROM THE RICH, OOZING ALLUVIAL MUD ONE SHOVELFUL AT A TIME...

The tide is falling fast now as we speed downstream, past the ruins of Old Town. A few ancient bricks buried in the bank beneath a low bluff mark the site of the first European settlement in the region, founded in 1664. But something else, strangely human in design, along the low, marshy banks opposite this place catches my eye. A row of jagged, wooden planks is emerging with the falling tide, like picket teeth, from the stained water. These are rot-resistant cypress boards, painstakingly placed here a century or more ago to reinforce expansive earthen dikes along the creek that once kept the water in or out of the rice fields, depending on the growing stage of the rice.

A clearer picture of this place is emerging as the tide continues to fall. The raised banks where the alligators have made their wallows are the remains of the rice dikes, which were heaped up from the rich, oozing alluvial mud one shovelful at a time by the hands of slaves. And the periodic openings in the dikes are the mouths of the ditches, or trunks, where a wooden floodgate allowed tide-driven river water to flow onto and off the fields.

As the wind gently whispers through the rice fields, I can almost hear the rhythmic Gullah chants, in unison with the sounds of crosscut saws and axes, as mighty cypress and gum trees are felled. My imagination tries to fathom the watery, insect-and-snake-infested conditions that the slaves endured as they cleared this boggy land some 200 years ago. And there was the mind-numbing task of building the complex network of ditches and dikes to grow the golden grains of rice,

all for the profit of the aristocratic planters.

My wanderings are abruptly interrupted in this sinuous place by a seemingly familiar shape up ahead in the murky water near the bank. My brain quickly makes the deduction that it is the snout and eye sockets of a very large reptile, no more than 10 yards dead ahead.

"That's an alligator!" I yell out to Bruce, half surprised, half terrified, and instantly back in the present.

"Yep," he says calmly, as the 12-foot gator slowly submerges into the dark water mere feet from the bow of our plastic craft.

Rise and Decline of Rice Culture

The cultivation of rice began in colonial America during the late 1600s in South Carolina, according to tradition, from a few handfuls of seed from Madagascar. The variety of rice with its peculiar golden husk and rich flavor soon developed the name Carolina Gold. Within a century, a burgeoning rice empire emerged along the Southeast coast, with its center based in vast tidal river plantations in the South Carolina Lowcountry, and extending north to Cape Fear and south through Georgia and into northern Florida. Carolina Gold was prized on the tables of European royalty and Chinese emperors as the best rice in the world. It also earned the landed planters vast fortunes.

Highly dependent on slave labor, the tidal-flow method of raising rice transformed the settlement and development of society along the Southeast coast. Only the production of naval stores—turpentine, rosin, tar and pitch—rivaled rice culture in its impact on the early coastal economy.

Because the planters relied on the rise and fall of tides to flood and drain their fields, the location of the rice plantation was critical to its success. The site had to be far enough upstream from the mouth of the river to avoid salt water, which would kill the rice, but not too far away to lose the pull of the tide.

The construction of a rice field began with the arduous task of building a large earthen dike, along the bank of a tidal river or creek, that connected on each end to high land. This would keep the tides back and out of the freshwater marsh while the trees and brush were felled. Once the marsh was cleared, smaller levees were built to divide the rice land into squares of about 20 acres each. Behind these levees, the slaves dug canals and ditches and installed doubled-doored floodgates, or trunk culverts, through the main dike to allow river water to flow onto and off the fields as needed. Finally, a number of smaller drains were dug and connected to the large ditches, further dividing the fields into one-acre plats that could be drained quickly and worked by one slave under the task system.

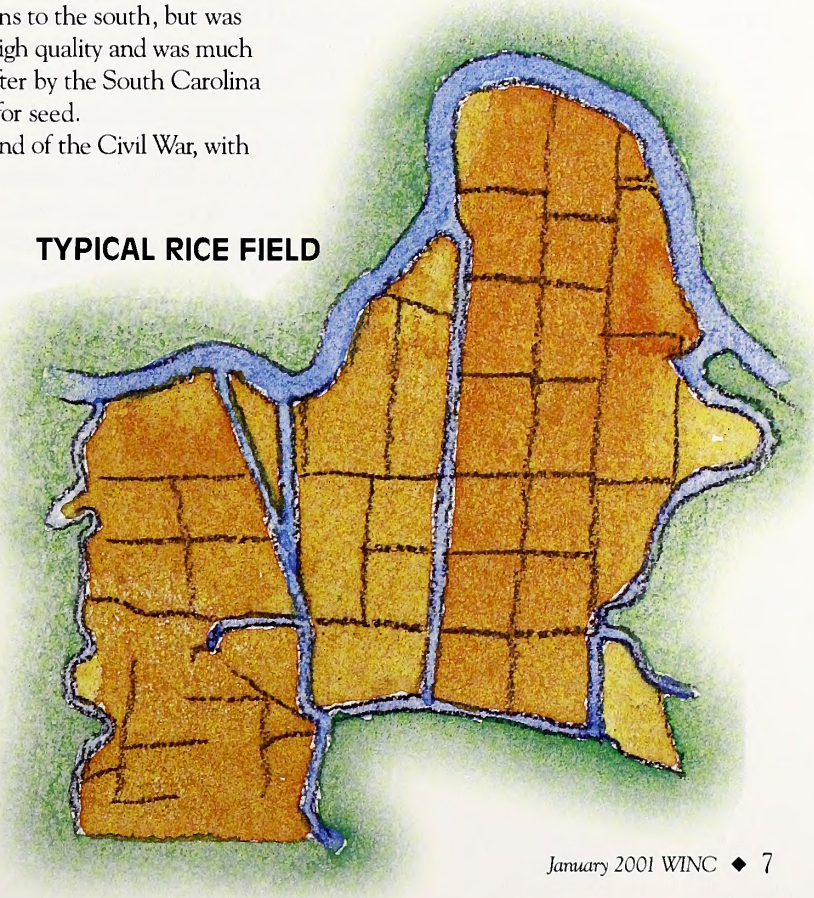
The complex hydraulics of the rice fields with their system of dikes, ditches, canals and gates required constant maintenance by a skilled slave force to keep everything running smoothly. And because of the limited number of locations where rice could be grown, rice lands quickly became the most valuable lands in the antebellum South. Once cleared and diked, improved rice lands sold for as much as $200 per acre, more than double the price of the best sugar lands on the Mississippi River.

Rice cultivation, along with slavery, came to the Cape Fear with the first permanent settlement of the region in the 1720s by wealthy planters from Goose Creek, S.C. It grew steadily through the end of the 18th century, with an increasing pace of production into the middle of the 19th century. At its height in 1859, more than 9 million pounds of rice were grown along the lower Cape Fear in about 5,000 acres of rice fields. (The national rice production for the year was 187 million pounds, with South Carolina and Georgia producing the lion's share.) At that time, there were 28 planters in the Cape Fear region, 20 in Brunswick County on the west bank of the river and eight in New Hanover County to the east.

A BURGEONING RICE EMPIRE EMERGED ALONG THE SOUTHEAST COAST, WITH ITS CENTER BASED IN VAST TIDAL RIVER PLANTATIONS IN THE SOUTH CAROLINA LOWCOUNTRY, AND EXTENDING NORTH TO CAPE FEAR...

Though never approaching the overall production of the vast plantations in South Carolina and Georgia, rice production along the Cape Fear had a high yield, averaging about 40 bushels per acre, about 10 bushels more than the average for the South. The rice produced in North Carolina was lighter in weight than that of the plantations to the south, but was of very high quality and was much sought after by the South Carolina planters for seed.

The end of the Civil War, with



***The construction** of a rice field was an arduous task. Once the main dike was built and the marsh was cleared, canals and smaller levees were constructed to divide the rice land into squares of about 20 acres each that could be independently flooded.*

***Cultivating rice** changed little over 200 years on the lower Cape Fear. Using sowing gourds, women would delicately distribute the rice seed onto the drained fields as pictured above at Orton Plantation in the 1890s. "The men were too clumsy" for sowing rice, explains Clarence Jones (below), who worked in the same rice fields as a young man in the 1920s.*

the end of slavery, brought ruin to most rice planters. For those who held on, a battering of hurricanes between 1893 and 1911 did extensive and repeated damage to their dikes and canals. But it was the development, toward the end of the 19th century, of a new rice-growing technique on upland prairies in Louisiana that spelled the end of tidal rice plantations along the Cape Fear and farther south. This new method, which employed heavy harvesting equipment, increased productivity by up to 20-fold. Though drained and dried prairies could support the heavy equipment, North Carolina's mucky tidal marsh soils could not. And so tidal rice was doomed to extinction by competition.

An editorial in the *Wilmington Post* published May 14, 1875, provides a glimpse of the ruin that was rice on the Cape Fear: "On the opposite side of the Cape Fear from Wilmington, and stretching nearly ten miles above and below the city lie thousands of acres of land as fertile as any to be found in America. Looking out from the roofs of any of our higher buildings the eye comprehends nearly the whole of a level green, once the source of princely incomes, but now nearly all an uncultivated waste. Where once waved the golden harvests of rice, there is now seen little but a melancholy picture of broken dikes, flooded marshes, and the ruined rice mills."

MELISSA McGAW

Raising Rice

But rice culture didn't end entirely with the end of slavery. Rice growing continued on into the 20th century before it was extinguished entirely. Someone who knows firsthand the rigors of raising rice is Clarence Jones, a 92-year-old Brunswick County man who worked at Orton Plantation for 64 years. Though he worked most of his years as a gardener, establishing and maintaining the plantation's exquisite formal gardens, Jones began his long stint at Orton in the rice fields, where he worked for several years until the last crop of rice was harvested on the Cape Fear in 1931.

"Planting rice wasn't too complicated really, but it was a lot of work," Jones said. Still, rice wasn't resented by the workers, he explained, because the labor provided scarce cash and as much free rice as you cared

N.C. ARCHIVES AND HISTORY

to eat. "At that time, most people, the black people especially, they was glad when it come time to go to work in the rice fields."

Preparing to grow rice in the spring required extensive work in the winter including repairing and shoring up broken dikes and trenching ditches to make sure the fields would drain properly. "Back then, we didn't have hurricanes like we have now, but we did have northeasters," Clarence said. "The wind would blow, and the tide would get real high, and the water would rise and go over the banks a lot of places and wash it out. With that open, you couldn't plant rice. You had to fix that before time to plant."

Planting time usually began in mid-March and could last into June. "When spring come, they prepared the land with a mule and they disked it up—it took a long time to get it ready," Clarence said. "Then, they'd come back with a harrow—it had teeth that was pulled to make rows, straight cross the field, backward and forth."

"Then after the harrow, the sowers would come along, mostly women—the men were too clumsy," Clarence said. Using long-handled sowing gourds, the women would delicately distribute the rice seed without having to bend over. "She'd go along and do a perfect job sowing that rice up and down those trenches," he said.

The seed was sown in shallow trenches, about a foot apart, then lightly covered with soil before the field was flooded with the next high tide. The fieldmaster would then put water on the fields by opening the gates to the river. This was the "sprout flow." "He knowed exactly how long to let that water stay on the field (usually about five days)," Clarence said. "Then, the rice would germinate and begin to sprout. You take the water off and the rice would come on out. Rice grows fast; it grows like a weed. The soil was very rich—you didn't have to use no fertilizer."

MELISSA McGAW

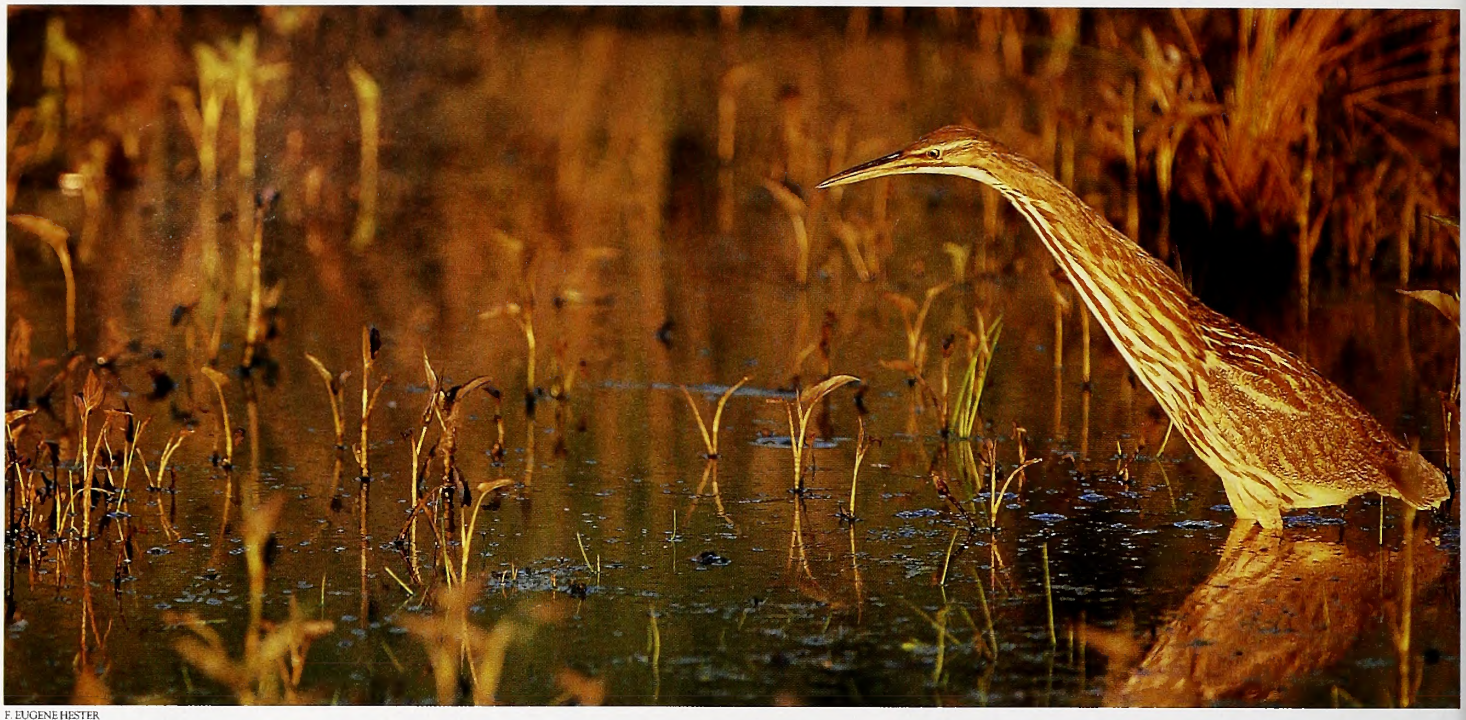
***Rice planters** amassed huge fortunes as evidenced by the grandeur of Orton House. Originally constructed in 1725 and later expanded in 1840 and again in 1910, the mansion stands as one of the few surviving reminders of the wealth generated by rice culture on the lower Cape Fear.*

Next came the hoeing. "We had a real grass problem, no weeds just grass—red shank and indigo," Clarence said. "So they would get a bunch of people in there with hoes—we called these 'rice-chopping' days. They would go through and shave that ground all up and down them rows," he said. "Then you let it set a day or two so the sun would cook it so the grass won't start growing again."

Just as when rice first came to the Cape Fear 200 years earlier, planting and harvesting were performed under the task system. "We did that by task work—so much money for each task, whether it was a long day or a short day," Clarence said. "If you wanted to do two tasks, you did that too."

When the rice approached 2 feet in height, the fields would be flooded again with the "rounding flood" so that just the heads of the rice remained above water. "That was to cause the rice to 'round up,'" Clarence explained. "The seed would be forming up in that pistil and the water would force it out and cause it to grow fast." Once the seed began to peek out, the water would be removed for good. "It would go on and grow and grow and it would all seed up and head out—it was a beautiful sight to see," he said. "Then it would turn yellow—it's fully grown then. And then you get ready to harvest."

Once the rice ripened beginning in early September, the workers would use hand sickles, or rice hooks, to cut and pile the rice in bundles, tied neatly with pieces of rice straw. Then the men would "shock," or stack, the rice up to keep it off the ground. "When



F. EUGENE HESTER

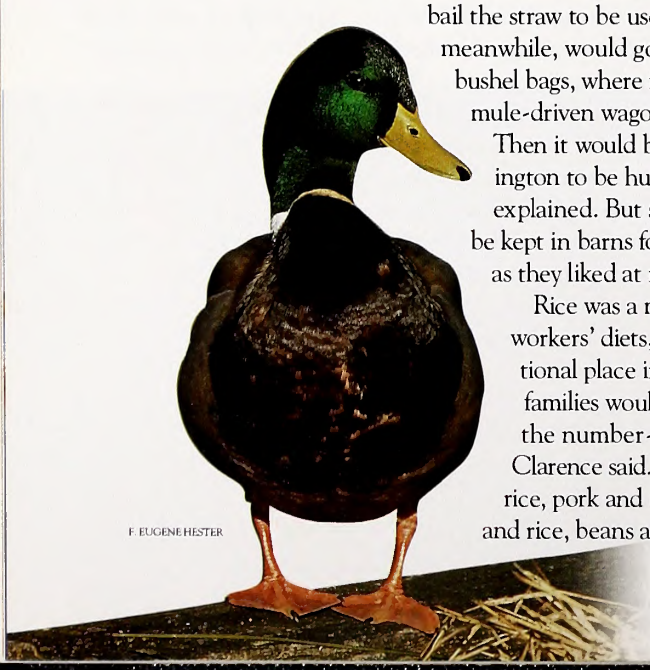
Abandoned *more than 50 years ago, the rice fields along the Cape Fear now provide a refuge for a rich variety of wildlife species including bitterns (above), alligators and the occasional mallard.*

they got finished shocking the rice up, it won't get wet no matter how much it rains," Clarence said.

But even then, the workers had to protect the crop from the rice bird—the bobolink.

"Now, we had a bad problem, with birds," Clarence said. "We had one called a rice bird, and they would come down by the millions, and if you didn't keep 'em off the rice, they'd eat it up." (See "Nature's Ways," p. 2.) "You start shooting birds at 4 o'clock in the morning. That's when the rice birds start a-workin'—just at the crack of day! They would cover the sky, when they get up, they would roll like thunder. You just keep 'em going backwards and forwards. They'd still eat a lot of rice, but they do it mostly on the ends of the rows."

Then the rice would be taken to the thresher, one of the few machines used in the process. The thresher would break the rice seed away from the straw and bail the straw to be used for horse feed. The rice, meanwhile, would go down a chute and into bushel bags, where it would be loaded onto a mule-driven wagon and taken to the docks. Then it would be shipped by barge to Wilmington to be husked, or finished, Clarence explained. But some of the rough rice would be kept in barns for the workers to eat, as much as they liked at no charge.



F. EUGENE HESTER

Rice was a major component in the workers' diets, and it still holds a traditional place in Southern cuisine. "The families would eat a lot of rice. It was the number-one thing on the menu," Clarence said. "Chicken and rice, fish and rice, pork and rice, collards and rice, peas and rice, beans and rice, just rice, rice, rice. It made a good meal because most people like rice and it would help out a whole lot when you didn't have other things to eat." Preparing rice for a meal required the use of a mortar and pestle to break the golden husk from the grain to expose the familiar white kernel. "You put this rice in the mortar and you take the pestle and you beat and beat it until all the husks come off," Clarence explained.

The variety of rice grown at Orton during the 1910s and 1920s was most likely Carolina Gold. This was one of the last places it would be grown for more than 50 years.

New Lease on Life

James Fox plucks the nearly ripe acorn from a twisted tree he planted on the banks of the rice dike some 20 years ago. "I'm convinced there's no better food for ducks than a live oak acorn," he says. "Problem is, it takes a while to grow one." And it also takes a while to restore a rice field. But that's what Fox, an avid duck hunter, has done on his nearly 500-acre tract, the remnants of an ancient Cape Fear rice plantation.

It's not the live oaks nor the intact dikes that holds my attention but the rice growing in one of Fox's six impoundments. No, he insists, it's not the delicate Carolina Gold variety, as I gaze at the rich field of golden grain, intermixed with Egyptian wheat and smartweed. "This is a new hybrid rice developed in Louisiana especially for wildlife," he says. "First year I planted it." Still, it is rice growing along the Cape Fear once again—and this time for wildlife.

Fox is one of a handful of landowners along the lower Cape Fear who are maintaining former rice lands for wildlife. Others, especially those along Town Creek, have placed easements on their lands to prevent development. And at ancient Orton Plantation, the old rice

fields where Clarence Jones once worked are now managed as a wildlife refuge.

There was a time when 15,000 puddle ducks wintered at Orton alone. But duck numbers along the Cape Fear have dwindled in recent years. The Cape Fear is no longer a haven for ducks as it once was, but an abundance of wildlife still uses these abandoned fields to rest, feed and breed.

The pace of development along our coast, especially the southern coast near Wilmington, has put these old plantations in a precarious situation. But the fact that many of the old rice lands along the Cape Fear are still held in large tracts gives wildlife and water quality a fighting chance, explains Watkins, with the Coastal Land Trust. "We can't look to protect these places piecemeal," he said. "We need to be looking to landscape-scale protection."

That's the approach that has been taken in other states especially South Carolina, to save some of these old rice lands for wildlife. In the ACE Basin region of South Carolina, nearly 200,000 acres of old rice fields and uplands have been preserved for wildlife through a complex network of private and public partnerships. And more recently, a new Waccamaw National Wildlife Refuge was created in South Carolina, eventually to include 50,000 acres of old rice plantations along the lower Waccamaw and Pee Dee rivers.

One of the leaders in wetland conservation is Ducks Unlimited, which was an integral partner in the ACE Basin effort. In South Carolina alone, the organization has conserved 84,000 acres of coastal lands for wildlife. Nearly half of that total is on former rice plantations, now managed extensively for waterfowl, wading birds and shorebirds.

"We have a very extensive effort in South Carolina called the Lowcountry Initiative," explains Kenny Williams, Ducks Unlimited regional biologist for the South Atlantic. "Our number-one emphasis is large plantation tracts for waterfowl and other wildlife habitat. These tidal rice fields are extremely valuable for wildlife."

After expending so much energy in South Carolina, Williams said, Ducks Unlimited is working to expand similar conservation efforts into North Carolina. "We have been active in North Carolina providing technical assistance to some landowners on the Cape Fear, and matching grants. We are now looking at some major projects in the state."

THE FACT THAT MANY OF THE OLD RICE LANDS ALONG THE CAPE FEAR ARE STILL HELD IN LARGE TRACTS GIVES WILDLIFE AND WATER QUALITY A FIGHTING CHANCE

Who knows? With the efforts of Ducks Unlimited, the Coastal Land Trust and others, the old rice fields around Wilmington just might get a new lease on life—this time for wildlife.

As I walk out on one of the old rice dikes with Clarence Jones, I can't get past the raw beauty of this watery place. I pause to listen to the wind rustling through the grass. Trout are chasing baitfish in the brackish rice fields and a marsh hawk is circling low on the hunt. A big smile forms on my face as Clarence continues another story about rice. I look around and can't think of a better place to spend some time. ⊠

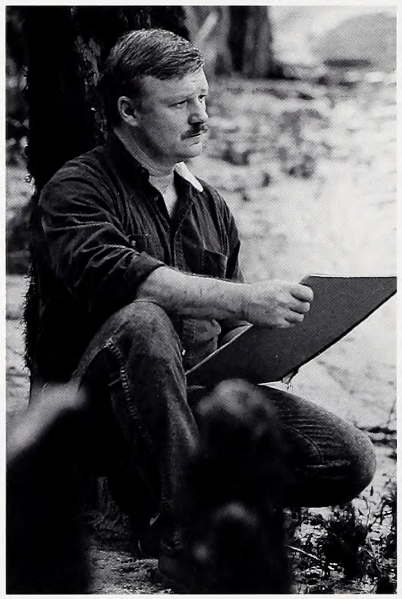
MELISSA McGAW

***An expansive** network of ancient ditches—dug at right angles by human hands—serves as a permanent reminder of the vastness of the rice fields near Wilmington. Through the efforts of conservationists, much of this watery land may yet be preserved for wildlife.*

The Long Goodbye

Following in the tradition of John James Audubon, artist Thomas Bennett is using painstaking technique to depict North Carolina's extinct and endangered wildlife.

paintings by Thomas Bennett ©2001



BRYAN TAYLOR JR.

Artist Thomas Bennett has come a long way since deciding that painting wildlife would be his life focus. Born in central Florida, Bennett developed his interest in painting wildlife on his family's cattle ranch which gave him many opportunities to know and appreciate the natural wonders around him. After graduating from high school, he worked with an architectural firm, but after his art was featured in several major art shows and magazines, he eventually decided to paint full time for a living.

"I traveled throughout the country trying to decide where to settle and was attracted to North Carolina because it was so diversified in its landscape," he says. "It's a storehouse of subjects, both flora and fauna. There are tremendous opportunities for a wildlife artist to depict the state because you'll never run out of material."

Stylistically, Bennett's paintings hearken back to John James Audubon, Louis Agassiz Fuertes and other wildlife painters of the 19th and early 20th centuries. Like Bennett, they were interested mostly in accuracy of detail and only incidentally in establishing a mood or painting a background.

Bennett's paintings of the extinct passenger pigeon, Carolina parakeet and ivory-billed woodpecker—all 30 inches by 40 inches—are part of an ambitious series of paintings that will consume the next 10 years of his life.

"Two years ago I started depicting the wildlife of North Carolina and the Southeast so people would have knowledge of their heritage," he said. "I'm beginning with species that have gone extinct. The loss of these unique species is to me unbelievable—the Carolina parakeet was our only native parrot species, you know. I think it's a crime what has happened to these species. People don't realize how fragile our environment is. You can't lose too many links before ecosystems suffer irreparable damage."

The finished series will contain a total of 70 or 80 paintings, although many of them will be of species that are not in trouble. Bennett's plan has found enthusiastic support at the N.C. Museum of Natural Sciences, where he has been named the first artist in residence.

"These works will celebrate the state's natural diversity and dramatically illustrate how important it is to preserve habitat for the many kinds of creatures that flourish here," said museum director Betsy Bennett, who is unrelated to the artist.

Thomas Bennett has completed several paintings in his monumental series, three of which are already hanging in the museum. Beginning this month Bennett can be viewed painting in the museum and answering visitors' questions.

"Hopefully, the collection will travel within the state and be an educational tool, especially in the outlying areas where people don't have a chance to visit the museum," he said.

Bennett said there's a little bit of fate involved in this big project. "My family was originally from colonial North Carolina, so I feel like I'm coming home again," he said. "It makes me even prouder to work on this project."

—Lawrence S. Earley

courtesy of N.C. Museum of Natural Sciences

Carolina Parakeet (extinct)

courtesy of Mr. & Mrs. Jerry Godwin

Great Blue Heron

courtesy of Mr. & Mrs. William Brooks

House Wren

courtesy of Mr. & Mrs. Bryan Taylor Jr.

Green Heron

courtesy of Mr. & Mrs. Donald Carter

Ivory-billed Woodpecker (extinct)

courtesy of N.C. Museum of Natural Sciences

Passenger Pigeon (extinct)

MELISSA McGAW

North Carolina Wildlife Resources Commission

biennial report

JULY 1 1998 - JUNE 30 2000

January 1, 2001

His Excellency, The Governor of North Carolina
Members of the General Assembly
Raleigh, North Carolina

Dear Sirs:

I am pleased to present to you the 25th Biennial Report of the North Carolina Wildlife Resources Commission. This report reflects the Commission's activities and accomplishments for the period beginning July 1, 1998 and ending June 30, 2000.

I am happy to report that during the biennium we remained fiscally sound and the Wildlife Endowment fund reached a balance of nearly $42 million. The Fund is supported entirely through the sales of lifetime licenses, lifetime magazine subscriptions and contributions, and only the interest can be spent to support the agency's many programs.

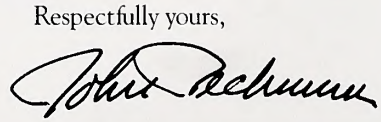
Significant accomplishments include a rededication and a reorganization of the Division of Wildlife Management to improve small-game populations, particularly bobwhite quail. I would also commend the heroism of our wildlife enforcement officers during the floods associated with Hurricane Floyd, and the magnificent and timely special issue of *Wildlife in North Carolina* in November 1999 on the Rivers of North Carolina.

Additionally, we have strengthened a long association with North Carolina State University as we plan the relocation of our headquarters to the university's Centennial Campus. The Pisgah Center for Wildlife Education has drawn thousands of visitors since its opening in 1997, and two new centers are in the planning stages on the Centennial Campus and at Corolla in Currituck County as we continue to place more emphasis on education.

The state's continued growth has made the Wildlife Commission more aware of the importance of restoring habitats, especially disturbed streams, and creating new ones. Governor Hunt's Million-Acre Initiative has added urgency to our game lands program. Several acquisitions during the biennium have added more than 14,000 acres to the program. Our engineers continue to provide our citizens, including those physically challenged, with creative access to these forests and waterways.

The North Carolina Wildlife Resources Commission appreciates the support of the governor and legislature during this period, as well as the support of the state's sportsmen and concerned citizens, and we pledge to rededicate ourselves to our central mission—ensuring a sound future for wildlife and for the habitat we share with them.

Respectfully yours,



John E. Pechmann, Chairman

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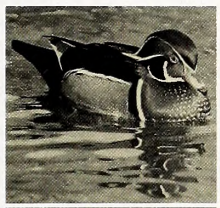

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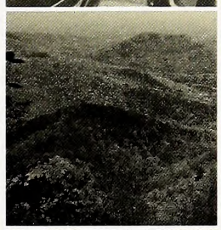

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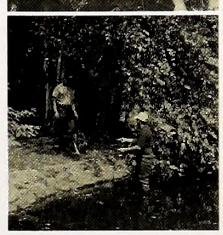

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New Beginnings

The N.C. Wildlife Resources Commission and its 514-member staff can look with pride on the progress of agency programs during its first 53 years, and we are also looking ahead to provide better hunting, fishing and outdoor opportunities for citizens in the years to come.

A highlight of the past biennium is a new direction for the Division of Wildlife Management under Dr. David Cobb, as the division takes an aggressive approach to improving the small-game populations of the state. The effort comes after the agency completed the very successful turkey restoration program which released the game birds to nearly 350 sites across the state.

During the biennium, the Fisheries Division added a star to its crown with the successful restoration of the striped bass on the Roanoke River, a fishery that provides outdoor recreation to thousands of anglers each spring. The division, under Fred Harris, will be shifting efforts to improving striper populations in other eastern North Carolina rivers in the next biennium. The Roanoke River restoration has led to a recommendation that seasons be set beginning in the 2001-2002 year rather than opening and closing the season by proclamation by Executive Director Charles Fullwood.

LEONARD LEE RUE III

New impoundments have provided additional habitat for waterfowl during the biennium.

Commissioners took bold steps in the biennium in approving the construction of two additional wildlife education centers to complement the recently completed Pisgah Center for Wildlife Education near Brevard. The Commission also approved construction of its own office building on the Centennial Campus of North Carolina State University in Raleigh. One of the wildlife education centers will be housed in this building, scheduled for completion in 2003. The third center will be on the Outer Banks at Corolla in Currituck County adjacent to the historic Whalehead Club.

The Wildlife Resources Commission was authorized by the General Assembly in 1947 and is charged with regulating and managing hunting, fishing, trapping and boating in North Carolina. Its 17 members are appointed by the governor, the president pro tempore of the Senate and the speaker of the House. It is currently headquartered in the Archdale Building in downtown Raleigh. The Commission's staff is scattered throughout the state's 100 counties.

John E. Pechmann, a Fayetteville attorney, serves as chairman of the commission with Wes Seegars, a Goldsboro businessman, as vice chair. Other members are C.J. Belch Jr.

MELISSA McGAW

The N.C. Wildlife Resources Commission is led by Chairman John E. Pechmann (left) and Executive Director Charles Fullwood (right).

of Roper, Charles W. Bennett of Matthews, Jim Bennett of Greensboro, Troy T. Boyd Sr. of Elizabeth City, Cy W. Brame Jr. of North Wilkesboro, Polie Cloninger of Dallas and Lawrence G. Diedrick of Rocky Mount.

Additional members are J. Robert Gordon of Laurinburg, Russell Maughan Hull Jr. of Elizabeth City, John F. Lentz of Ellerbe, Eugene Price of Goldsboro, Bobby Purcell of Cary, Bobby N. Setzer of Cullowhee, W. Ray White of Manteo and Arthur J. Williams III of Washington.

These commissioners set the policy under which the Commission operates. Each March they set the fishing, hunting and trapping regulations after the proposals have been presented to the sportsmen of the state with a public hearing in each of the nine wildlife districts. Commissioners attend the public hearings and other meetings to receive input from sportsmen. Sportsmen not only can comment on proposals during the nine hearings, they also may make suggestions for regulations changes in future years.

"We are constantly thinking of our sportsmen and sportswomen and how to provide them with the best possible hunting and fishing opportunities," Chairman Pechmann said. "To deliver these opportunities, we acquire game lands, protect and preserve existing resources and habitat, educate the public and use engineering to provide safe access to these tracts of land and bodies of water. Across the board, we strive to improve, and because of the talent of this staff, we have met with much success. I am proud to be associated with this agency."

Day-to-day operations are headed by Executive Director Charles Fullwood, who is assisted by Richard Hamilton, assistant director. The Wildlife Resources Commission has six divisions working to provide the outdoor opportunities referred to by Chairman Pechmann. They are Wildlife Enforcement, Wildlife Management, Inland Fisheries, Conservation Education, Engineering Services and Administrative Services.

The record shows that the Commission has been fiscally responsible. Not since 1987 has there been an increase in fishing and hunting license fees in the state. The agency and sportsmen alike can be proud of this fiscal accomplishment, which is due in part to the Wildlife Endowment Fund. This fund has allowed the agency to improve and expand programs and services without increasing hunting and fishing license fees.

The Endowment Fund was established in 1981. On June 30, 2000, it had a market value of $41,826,464.95. Only the interest from this fund can be used for programs; each division receives some funding from the endowment each year under a prescribed formula. In addition, the commissioners can allocate funding for special projects.

Wildlife Enforcement

The main responsibilities of the Wildlife Enforcement Division are to conserve wildlife and protect the hunting, fishing and boating public. Yet wildlife enforcement officers are also called upon to help in emergency situations. Wildlife officers carried out some of the most significant emergency activities after Hurricane Dennis and Hurricane Floyd struck eastern North Carolina in September 1999, triggering the worst flooding in the history of the state. Approximately 128 officers from all districts in the state provided help to state, county and local law enforcement agencies in the performance of law enforcement and rescue operations. They helped protect against looting, enforced mandatory curfews and assisted with the evacuation and transportation of prisoners from county law enforcement facilities. Their four-wheel drive vehicles and johnboats were instrumental in emergency rescue operations during the flooding, providing transportation for search and rescue teams.

These officers performed with a tremendous sense of duty, dedication and service toward the victims of this natural disaster.

The division's canine unit continues to excel in many areas of law enforcement as evidenced by numerous requests for assistance from various agencies across the state. Many wildlife violations are detected each year by these dedicated canine teams as they continue to provide a valuable resource for the division. From locating illegal bait sites, illegally taken game, firearms, ammunition and even hunters themselves, these canine teams are an effective enforcement tool. Wildlife canine teams have also been involved with state and local law enforcement agencies in the search for and apprehension of wanted persons, search and rescue operations, crime scene evidence searches and many other important tasks.

LAWRENCE S. EARLEY

Wildlife enforcement officers gather for daily instructions near Greenville in the days after Hurricane Floyd. Officers performed heroically to rescue flood victims and perform basic law enforcement.

Some of the division's other accomplishments during the biennium include:

TRAINING

- Conducted an In-Service school for wildlife enforcement officers over a six-week period at the N.C. Justice Academy in Salemburg. All officers attended one of the four-day sessions covering wildlife identification, physical fitness, defensive tactics, motorboat law, procedures governing the detecting of boaters operating vessels while impaired, and a review of arrest, search and seizure topics.
- Conducted the 2000 Wildlife Enforcement Officers Basic School. More than 400 applicants were screened with 18 selected to attend the recruit school that was held at the N.C. Justice Academy.

LEONARD LEE RUE III

Growing bear populations in eastern and western North Carolina have added more responsibilities to officers charged with conserving wildlife.

EMERGENCY MANAGEMENT

- Responded to winter weather emergencies during the blizzard-like conditions that occurred in January 2000. Numerous requests were received from Piedmont law enforcement agencies for assistance with patrol and transportation. Along with these duties, officers were called upon to transport special-needs patients to medical facilities, including transporting kidney dialysis patients for their critical daily treatments.

HUNTER EDUCATION

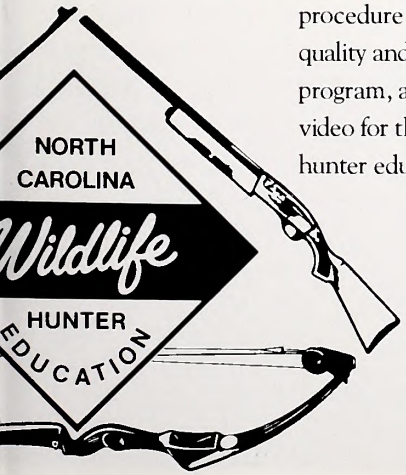
- Certified more than 14,000 hunter education students annually during the past two years. Live firing and other hands-on activities in hunter education were encouraged to make classes more interesting and to better prepare hunters for the field.
- Purchased a firearms projection system, which offers a simulated live fire experience, and put it into use statewide.
- Emphasized the training and support of 1,000 volunteer hunter education instructors during the past two years. Developed a hunter education procedure manual to ensure quality and uniformity in the program, and a two-hour video for the 10-hour hunter education course.

BOATING EDUCATION

- Passage of a law requiring young Personal Watercraft (PWC) operators to take a boating-safety course boosted students interested in boating education during the 2000 calendar year. The number of boating safety students more than doubled during the past year.
- Developed a home study course to assist people unable to attend a regular classroom course.
- Directed a safe-boating campaign aimed at the use of PFDs. Wildlife officers have been promoting safe boating during their patrol and have been distributing various promotional materials. Officers rewarded children wearing PFDs with either a T-shirt or a sticker. Boating education was the central theme for the 2000 boating season, with officers giving out whistles and children's activity books.

goals *for the* new biennium

- To ensure future populations of our state's wildlife resources by vigorously enforcing the hunting and fishing rules and regulations.
- To educate and enhance the awareness of the public in the areas of hunting, fishing and boating through our hunter and boating safety classes.
- To significantly reduce the number of boating accidents, injuries and fatalities by our educational programs and law enforcement efforts.
- To make hunting a safer sport by reducing the number of hunting accidents, injuries and fatalities. This can be accomplished through hunter-safety training and our enforcement of rules and regulations.

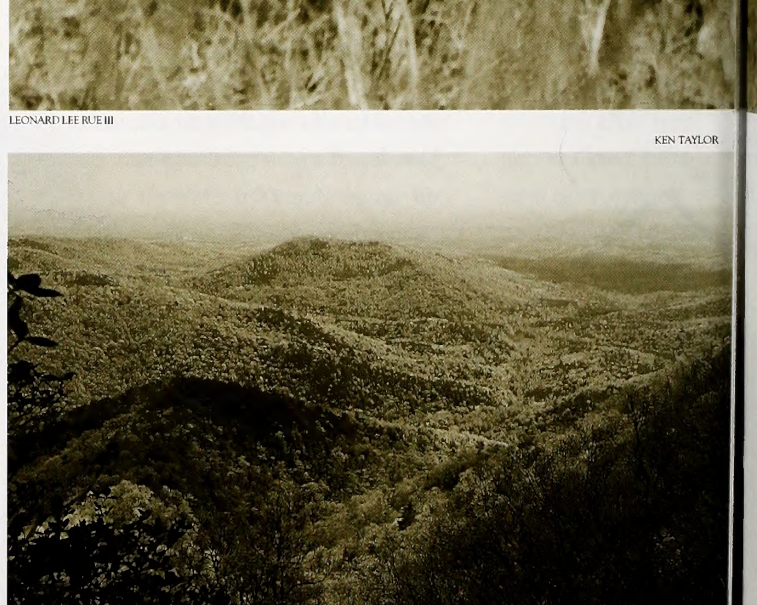


MELISSA McGAW

Wildlife Officer Kevin Holland checks a fishing license on a Piedmont lake.

Wildlife Management

LEONARD LEE RUE III



KEN TAYLOR

The Division of Wildlife Management's mission is three-fold: to monitor the health and status of wildlife populations; to develop and administer programs for the management and wise use of wildlife; and to help resolve human-wildlife interactions to assure diverse wildlife resources for future generations of North Carolinians. Over this biennium, the division provided services through its three sections—Land Management and Budget, Research and Regulations, and Nongame and Endangered Wildlife. Services included provision of 1.8 million acres of public hunting, fishing and trapping through our Game Lands Program; special, high-quality hunting opportunities through our permitted hunts program; technical guidance to landowners wanting to manage wildlife populations and habitats on their lands; and monitoring the health and status of wildlife populations.

Land acquisition and expansion of the Game Lands Program continued through the biennium. The Commission purchased 35 tracts of land totaling approximately 14,000 acres. These additions were made possible through several partnerships involving the Clean Water Management Trust Board, Natural Heritage Trust Board, U.S. Fish and Wildlife Service and the North Carolina Wildlife Endowment Fund. Special hunt opportunities including dove, waterfowl, deer, small game, turkey, youth turkey and youth waterfowl increased by 75 percent. These hunts are designed to provide high-quality hunting opportunities to all sportsmen across North Carolina. In addition to these opportunities on Commission-managed game lands, public waterfowl hunting was provided for the first time in Currituck County through coopera-

The Wildlife Commission added 14,000 acres of new game lands during the biennium. Wildlife biologist Carl Betsill (right) works with conservation agent Wayne Short to encourage no-till cultivation that prevents erosion and boosts small-game populations.

With North Carolina's deer populations at an all-time high, hunters are looking for additional access to good hunting opportunities.

tive efforts among the Commission, U.S. Fish and Wildlife Service and the Currituck County Game Commission.

This biennium marked an historic milestone for wildlife restoration in North Carolina. The Commission and its supporting partners, including the National Wild Turkey Federation, celebrated the conclusion of wild turkey restoration in our state. The restoration effort began in earnest in 1970 when biologist Wayne Bailey was hired as our first full-time Wild Turkey Project Leader. On March 20, 2000, Commission staff captured 10 hens in Caswell County and released them in Johnston and Wilson counties to mark the completion of the 30-year effort that included release of 5,367 wild turkeys on nearly 350 restoration sites across the state.

While this major milestone was completed, the biennium ushered in the beginning of another. On Aug. 30, 2000, the Commission appropriated $1 million dollars to begin a renewed emphasis on management of small game and other species that depend on early-successional habitats.

The Nongame and Endangered Wildlife Program continued to expand its efforts in several areas, notably sea turtle nesting and mortality monitoring; surveys and monitoring of other aquatic species; and the Partners in Flight Project. Nongame biologists continued ongoing management and monitoring efforts on behalf of colonial nesting waterbirds, shorebirds, songbirds, bog turtles and red-cockaded woodpeckers. They also completed projects to model habitat and predict occurrences for northern flying squirrels, to determine productivity of piping plovers and to determine the distribution of cerulean warblers.

A new survey was initiated to determine the distribution and genetics of the wood rat in North Carolina, and nongame biologists also monitored bird populations on selected mountain game lands.

goals *for the* new biennium

- Implement new initiatives on public and private lands to promote management of small game and other wildlife associated with early-successional habitats.
- Initiate aquatic species restoration projects across the Piedmont.
- Acquire 50,000 acres and add to the Game Lands Program.
- Increase technical assistance to private landowners.
- Conduct a coast-wide colonial nesting waterbird survey.

KEN TAYLOR

Wildlife Management

Some of the division's other accomplishments during the biennium include:

SMALL GAME

- Completed field work on the project to evaluate bobwhite quail responses to habitat improvements and predator reduction.

LAND MANAGEMENT

- Acquired 14,000 acres of property and added it to the Game Lands Program.

WATERFOWL

- Completed two Ducks Unlimited/N.C. Wildlife Resources Commission "MARSH" (Matching Aid to Restore State's Habitat) projects. These included the construction of a 12-acre waterfowl impoundment on Caswell Game Land and work on the Catfish Lake Waterfowl Impoundment in the Croatan National Forest.
- Opened 900 acres of waterfowl impoundments on Butner/Falls of the Neuse Game Land. These impoundments are part of the U.S. Army Corps of Engineers' mitigation package for construction of Falls Lake.

SPECIAL HUNTS

- Increased special hunt opportunities by 75 percent. Expanded special hunts included dove, waterfowl, deer, small game and turkey hunting opportunities. Youth hunting opportunities have also been expanded.

WILDLIFE RESEARCH

- Conducted research projects on black bear highway crossings, grouse use in forest treatments, swan migration patterns and survival, and evaluation of an experimental hunting season for teal. Research results continue to provide the foundation on which management decisions are based.

NONGAME AND ENDANGERED WILDLIFE

- Acquired $2 million in grants to better manage important aquatic habitats in the Charlotte area. Emphasis is on managing for improved water quality and survival of associated freshwater wildlife, including several species of endangered mussels.
- Developed new partnerships and initiated a strategic planning process for North Carolina Partners In Flight.
- Monitored 78 colonies of nesting waterbirds, including 56,689 nests of 23 different species. Overall, North Carolina continues to provide vital nesting habitat for many species of nesting waterbirds.
- Completed major aquatic surveys in the Pigeon, Little, Cheoah, Neuse, Tar, Cape Fear and Pee Dee river basins. These surveys continue to expand our knowledge of aquatic systems and management needed to prevent degradation.

KEN TAYLOR

"The Commission appropriated $1 million dollars to begin a renewed emphasis on management of small game and other species that depend on early-successional habitats."

Inland Fisheries

North Carolina's western mountain trout streams, our Piedmont reservoirs and the blackwater streams of the Coastal Plain are among the most diverse aquatic resources found in our nation. Considering the level of public participation in fishing, the diverse fishing opportunities available and the significant economic impacts that result from fishing, sound management of North Carolina's fishery resources is essential to the long term sustainability of these renewable resources. The Division of Inland Fisheries is responsible for the management, development, conservation, protection, enhancement and regulation of our abundant inland fisheries resources and supporting ecosystems. Our mission is to manage the fishery resources to provide diverse angling opportunities for all North Carolinians and our guests.

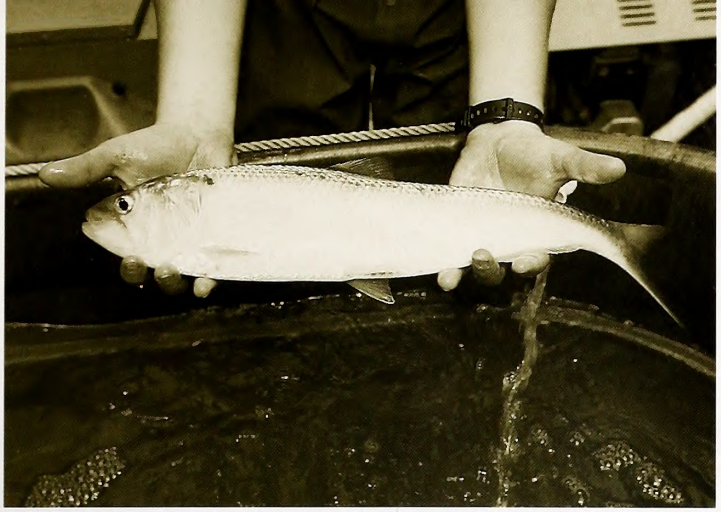
The following is a sampling of our accomplishments for the biennium:

HABITAT CONSERVATION

- Reviewed approximately 3,800 environmental documents and permit applications associated with development, providing recommendations to permitting agencies and developers on ways to minimize adverse impacts to fish and wildlife resources and their habitats.
- Participated in the relicensing of six hydropower projects by the Federal Energy Regulatory Commission to ensure that fish and wildlife resources receive as much consideration as hydropower production, as mandated in the Federal Power Act.
- Restored almost 10,000 linear feet of degraded trout streams to high quality aquatic and riparian habitats, under contract with the N.C. Department of Transportation.

MELISSA McGAW

Fisheries biologist Joe Mickey (left) and Natural Resources Conservation Service agent Dick Everhart survey the Mitchell River's South Fork in Surry County as part of an effort to restore eroded streambanks.



KEN TAYLOR

Fisheries biologists are working with the U.S. Fish and Wildlife Service and the Division of Marine Fisheries to restore American shad popu-lations in the Roanoke River.

RESEARCH AND SURVEY

- Worked cooperatively with the U.S. Fish and Wildlife Service and the Division of Marine Fisheries to restore American shad in the Roanoke River. A total of 358,000 shad were produced at the Commission's Watha Hatchery and the Edenton National Fish Hatchery and stocked back into the Roanoke River.
- Collected fish samples from coastal rivers to develop an index of fisheries quality based on the abundance, diversity and ecological considerations of fish species. The study will provide a means to assess the impacts of pollution on fisheries.
- Collected abundance, age and sex information from striped bass spawning in coastal rivers to assess the condition of the spawning stock.
- Produced shoreline management plans with owners of reservoirs in the Roanoke, Yadkin and Catawba watersheds to include provisions to protect fisheries habitat, critical areas for fish and other wildlife species and access for anglers and other resource users.
- Assessed populations of gizzard and threadfin shad in Piedmont and Mountain reservoirs to determine whether alewife and blueback herring, which are being found in increasing locations, are having adverse impacts on native fish populations.
- Completed creel surveys of four delayed harvest and six hatchery-supported streams to learn about fishing pressure, catch rates and angler opinions on management activities.
- Located 350 brook trout populations and genetically typed 150 of them to learn more about brook trout distribution and genetics. Identified about 50 southern Appalachian strain populations.
- Completed black bass surveys on Santeetlah and Nantahala reservoirs. Santeetlah continues to support a good largemouth bass fishery, and in Nantahala largemouth and smallmouth bass of large size were collected.

FISHERIES MANAGEMENT

- Constructed fishing piers accessible to disabled trout anglers on the Davidson River and on Cane Creek in Mitchell County. Constructed another fishing pier accessible to disabled anglers on Bells Church public fishing area on Jordan Lake. Received a donation of land and monies from Barnhill Construction Company for the development of three public fishing area tracts near Tarboro.

OUTREACH

- Expanded the Community Fishing Program to include 26 sites and 46 Public Fishing areas.
- Held more than 60 Fish-for-Fun events with approximately 6,000 participants. Rods and reel outfits were loaned out more than 3,500 times from 33 Fishing Tackle Loaner Program sites.
- Designed and constructed a mobile aquarium to complement the aquatic outreach efforts.

goals for the new biennium

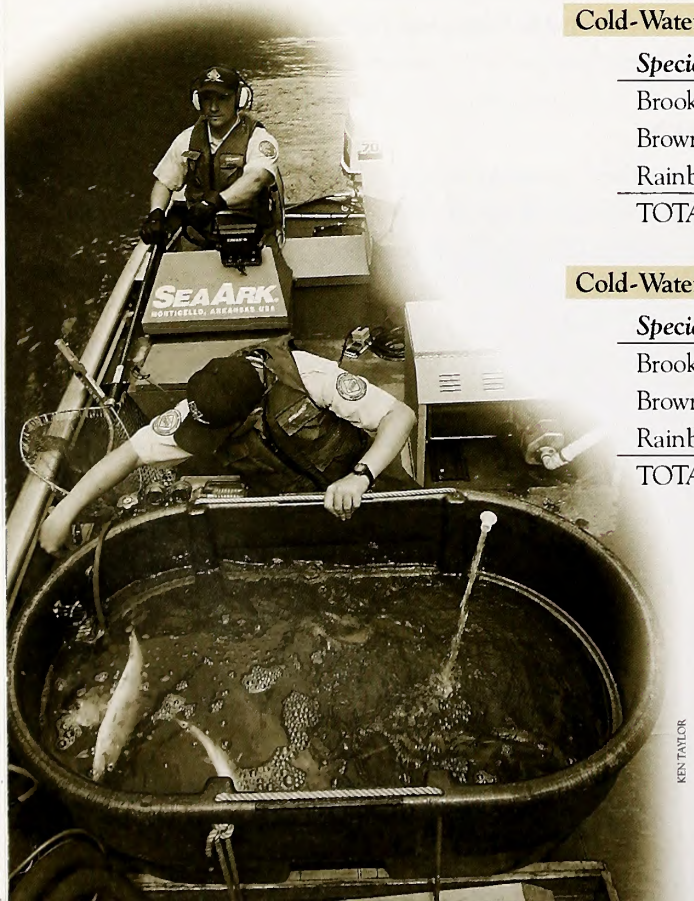
- Manage the state's inland fisheries to provide sustainable and diverse fishing opportunities for the public.
- Protect and enhance fisheries habitats statewide.
- Restore and enhance resources and ensure public-use opportunities through agency participation in the Federal Energy Regulatory Commission relicensing process.
- Enhance statewide production of cultured fishes.
- Improve and increase fishing opportunities in urban areas through aquatic outreach programs.
- Obtain information for fisheries management decisions directly from the angling public.

SPORT FISH RESTORATION

Inland Fisheries

FISH PRODUCTION PROGRAM

Fisheries biologists collect data from spawning striped bass in coastal rivers to assess the condition of the spawning stock. Data collected in the Roanoke River help estimate total population abundance and determine appropriate levels of harvest.



KEN TAYLOR

Warm-Water Fishes Stocked

Species	*Size*	*1999*	*2000*	*Total*
Striped Bass	2-6 inch	916,192	1,116,307	2,032,499
Bodie Bass	2-7 inch	103,330	125,768	229,098
Largemouth Bass	3 inch	1,800	81,490	83,290
Redbreast	2 inch	40,000	145,000	185,000
Bluegill	2 inch	43,770	269,425	313,195
Redear	2 inch	40,500	197,500	238,000
Channel Catfish	4-16 inch	263,000	178,089	441,089
Threadfin Shad	Adult	48,800	0	48,800
American Shad	Fry	50,000	308,000	358,000
TOTAL		1,507,392	2,421,579	3,928,971

Cool-Water Fishes Stocked

Species	*Size*	*1999*	*2000*	*Total*
Walleye	3 inch	30,000	30,000	60,000
Muskellunge	8-14 inch	2,162	380	2,542
Smallmouth Bass	3 inch	25,000	0	25,000
TOTAL		57,162	30,380	87,542

Cold-Water Fishes Stocked (Catchable Trout)

Species	*1999*	*2000*	*Total*
Brook	253,227	294,256	547,483
Brown	113,541	123,846	237,387
Rainbow	286,423	276,174	562,597
TOTAL	653,191	694,276	1,347,467

Cold-Water Fishes Stocked (Fingerling Trout)

Species	*1999*	*2000*	*Total*
Brook	3,500	4,000	7,500
Brown	43,500	79,805	123,305
Rainbow	13,500	15,500	29,000
TOTAL	60,500	99,305	159,805

MELISSA McGAW

"Sound management of North Carolina's fishery resources is essential to the long-term sustainability of these renewable resources."

Engineering Services

In July 1997, the N.C. Wildlife Resources Commission approved an agency reorganization plan establishing the Division of Engineering Services. The increased magnitude, scope and frequency of engineering-related projects necessitated the reorganization. This change was implemented to improve the efficiency, productivity and subsequent delivery of engineering services and project management to the agency.

MELISSA McGAW

Wildlife Commission engineers are continuing to remove accessibility barriers to handicapped anglers and boaters throughout the state. New fishing piers and boating-access areas accessible to the handicapped have been constructed during the biennium.

The primary missions of the Division of Engineering Services are to direct, plan and manage all engineering-related projects for the Wildlife Commission. Additionally, the division administers the construction and maintenance of boating-access areas and waterway marking.

The division's field staff is mainly composed of boating technicians who construct, maintain and renovate the Wildlife Commission boating access areas. The field staff is divided into eight crews, which span the coastal, Piedmont and mountain regions of the state. These crews include Belcross Depot (Camden), New Bern Depot (New Bern), Chinquapin Depot (Wallace), Fayetteville Depot (Fayetteville), Weldon Depot (Weldon), Troy Depot (Troy), Marion Depot (Marion), Balsam Depot (Waynesville).

Each year the Wildlife Commission issues permits for groups to host fishing tournaments and use boating-access areas across the state. In the year 2000, for example, the agency will issue well over 1,000 of these permits. The main purpose of the permits is to ensure that multiple events are not occurring concurrently at any site, thereby helping to manage congestion and user accessibility. Currently, these permits are issued at no fee and must be available on-site during the special event or tournament weigh-in.

Design, construction and maintenance of boating-access areas use 85 percent of the division's budget, primarily due to the operation and maintenance of more than 185 public boating-access areas across the state. These access areas allow free 24-hour access to 80 different bodies of water in North Carolina. A free list of these access areas by body of water can be ordered by calling the Division headquarters in Raleigh. It can also be viewed online at www.ncwildlife.org.

The waterway marking program includes the maintenance of over 1,200 buoys and navigational aids statewide. This program conforms to the U.S. Coast Guard Uniform Waterway Marking System. Boating technicians help to administer and maintain this program.

Capital projects coordination is the planning and managing of all architectural and engineering services delivered to the agency. The capital projects coordinator serves as a liaison between the State Construction Office, designers and contractors. The Raleigh office staff administers this program.

NEW BOATING-ACCESS FACILITIES CONSTRUCTED IN THIS BIENNIUM:

Access Area	*County*	*Body of Water*
Poyners Road	Currituck	North Landing River
Oriental	Pamlico	Smith's Creek
Cedar Island	Carteret	Pamlico Sound
Pollocksville	Jones	Trent River
Water Street Landing	Washington	Roanoke River
Hydeland Canal	Hyde	Pamlico Sound
Price's Landing	Wayne	Neuse River

BOATING ACCESS FACILITIES RENOVATED IN THIS BIENNIUM:

Access Area	*County*	*Body of Water*	*Description of Renovation or Improvement*
Beaufort (Taylor's Creek)	Carteret	Taylor's Creek	Renovated existing docks and added a floating dock
Smith's Creek	Beaufort	Pamlico River	Renovated ramp and dock and added a handicapped parking space
Lee Landing	Pamlico	Upper Broad Creek	Renovated ramp and dock and added a handicapped parking space
Hibernia (Ivy Hill)	Vance	Kerr Lake	Installed a Floating Dock and handicapped parking space
Holden Beach	Brunswick	Intracoastal Waterway	Renovated ramp and docks; installed vinyl bulkhead
Grifton	Pitt	Contentnea Creek	
Shoups Landing (Winton)	Gates	Chowan River	
Brumley Road	Currituck	Currituck Sound	Expanded parking area

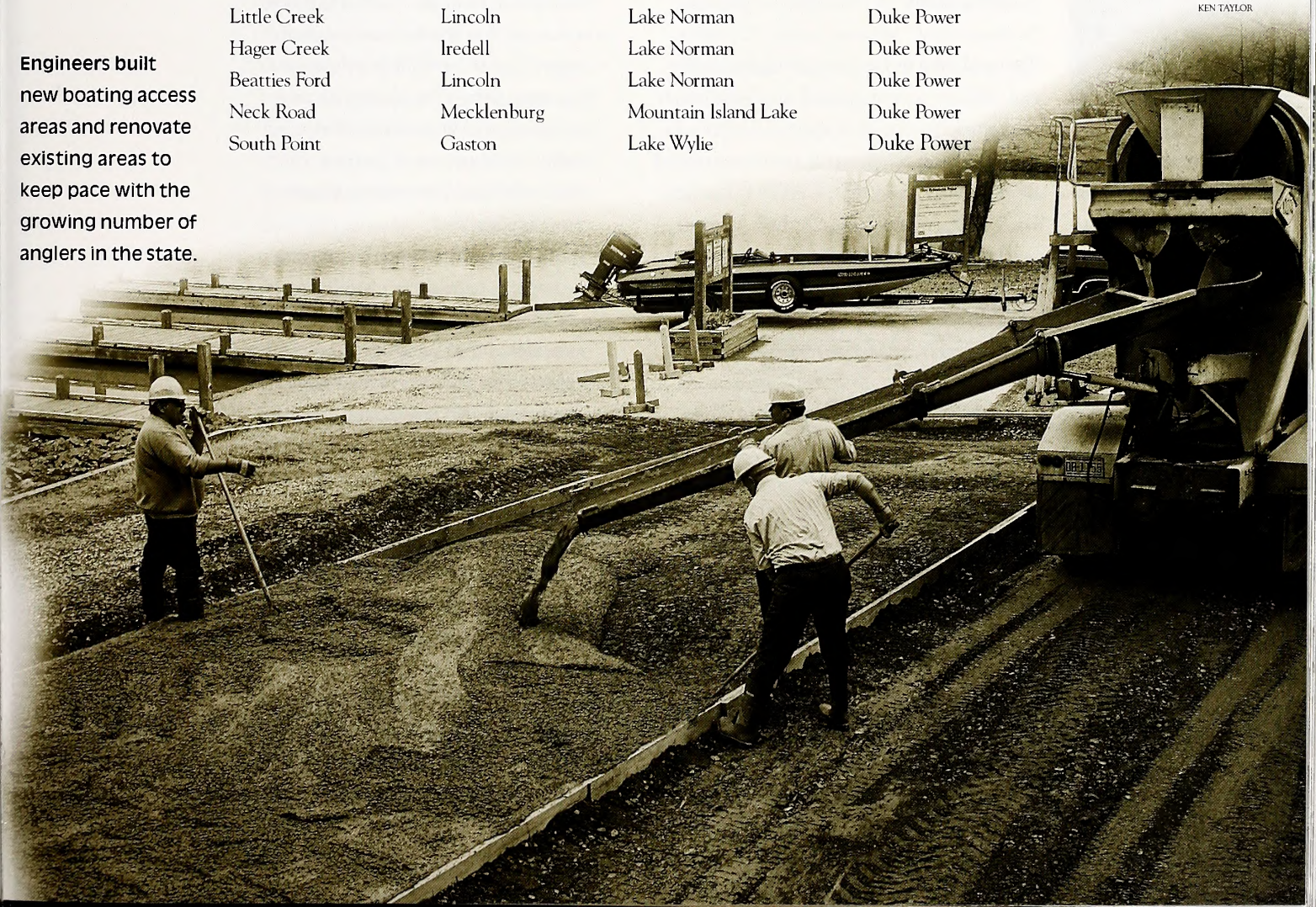
NEW BOATING ACCESS FACILITIES ACQUIRED THROUGH COOPERATIVE AGREEMENTS IN THIS BIENNIUM:

Access Area	*County*	*Body of Water*	*Co-op Participant*
Riverbend	Gaston	Mountain Island Lake	Duke Power
Long Island	Catawba	Lake Norman	Duke Power
Pinnacle	Iredell	Lake Norman	Duke Power
McCrary Creek	Iredell	Lake Norman	Duke Power
Little Creek	Lincoln	Lake Norman	Duke Power
Hager Creek	Iredell	Lake Norman	Duke Power
Beatties Ford	Lincoln	Lake Norman	Duke Power
Neck Road	Mecklenburg	Mountain Island Lake	Duke Power
South Point	Gaston	Lake Wylie	Duke Power

goals *for the* new biennium

- Continue to enhance free public access to the waters of the state by constructing new and renovating existing boating-access facilities.
- Continue striving to remove accessibility barriers at boating access facilities for persons with disabilities.
- Extend resource provision by developing and utilizing untapped partnership potential.
- Continue to develop the Capital Improvement Program to ensure optimum delivery and administration of architectural and engineering services to agency.

KEN TAYLOR



Engineers built new boating access areas and renovate existing areas to keep pace with the growing number of anglers in the state.

Conservation Education

KEN TAYLOR

Becoming an Outdoors-Woman workshops are gaining in popularity each year. Conservation Education specialists added new workshops on fly-fishing and hunter safety during the biennium.

Education is a critical part of any conservation effort. The division of Conservation Education plays an essential role in wildlife conservation through the activities of its educators, writers, photographers, designers and support staff. All of these individuals continue to focus on the main theme of the division's many endeavors—that all things are connected. Decisions about roads, community growth and similar important issues ultimately affect wildlife. By providing accurate knowledge of natural resources, ecology and stewardship of the environment, the division hopes to help the public better consider these important issues when such decisions are being made.

The work of the division is divided into several different areas. Education specialists reach out to teachers, scout leaders and other educators through hands-on workshops provided by N.C. WILD and N.C. CATCH. Teachers want to learn how to reach their students better. The interdisciplinary workshops are fun and give the participants interesting examples of how they can use the natural world to accomplish the learning objectives outlined in the state school curriculum, as well as the advancement programs of several youth organizations.

Other division employees are working at the Wildlife Commission's Pisgah Center for Wildlife Education. The facility offers interactive indoor and outdoor exhibits, a classroom for workshops and trout-rearing raceways that demonstrate the Commission's work and its mission to thousands of visitors each year.

The division's many publications are aimed at educating North Carolina's citizens about the interrelated and essential roles of wildlife in our natural world. The award-winning *Wildlife in North Carolina* magazine is the division's flagship publication. However, the division is increasing the number and diversity of other educational publications, which include the North Carolina Wildlife Calendar, books, videos, posters and fact sheets about native North Carolina wildlife.

Here is a look at the accomplishments of the Conservation Education Division during the biennium.

WILDLIFE EDUCATION CENTERS

- Despite less than two years of full-time operation, the Wildlife Commission's Pisgah Center for Wildlife Education is proving to be a resounding success, attracting more than 200,000 visitors during the biennium, 10 percent of whom attended a structured educational experience.
- The success of the Pisgah Center was the impetus behind the planning for two new wildlife education centers that will open within the next three years. One is planned for the Outer Banks region at Corolla, in Currituck County; and the other will be located in Raleigh at the Wildlife Commission's planned headquarters on the Centennial Campus of North Carolina State University. Educators need places to bring students for a higher level of involvement with environmental education.

WILDLIFE IN NORTH CAROLINA

- Published "Rivers of North Carolina," an unprecedented 128-page special issue of the magazine in November 1999. Articles

LEONARD LEE RUE III

explored all 17 of the state's river basins, and discussed aquatic issues that included the costs and benefits of dams, the nature of watersheds and the restoration of rivers and streams throughout the state. The issue won the N.C. Wildlife Federation's "Communicator of the Year" award at its annual banquet in Feb. 2000. Staff writers won three awards at the annual awards banquet of the Association for Conservation Information.

NORTH CAROLINA WILD

- Education specialists gave a variety of North Carolina WILD programs that reached nearly 18,000 people. North Carolina WILD continues as one of the most comprehensive and popular of the division's conservation education programs, offering workshops coordinated through the state's public, private and home school systems, institutions of higher learning, technical schools, youth organizations, communities and businesses.

NORTH CAROLINA CATCH

- Reached more than 12,000 educators through workshops conducted by the education specialists with the division. This aquatic resources program promotes the understanding of aquatic environments through hands-on learning activities, educational materials, aquatic field trips and fishing experiences.

BECOMING AN OUTDOORS-WOMAN

- Expanded from one event each year to several events during the year. The BOW program continues to grow in popularity. Specialty events—saltwater fly-fishing and hunter safety—offered at various places around the state are also being enthusiastically received.

N.C. WILD STORE

- Opened an additional retail outlet at the Pisgah Center at which books, posters, videos and other educational items are sold. The receipts from the sale of these items enable the division to provide more educational products and programs to the public.

STATE FAIR EXHIBIT

- Chaired the Wildlife Commission's State Fair exhibit in 1998 and 1999. The exhibit, annually assembled by all Wildlife Commission divisions, won the Department of Agriculture's award for best noncommercial exhibit in both years.

goals for the new biennium

- Continue to expand the N.C. WILD Store.
- Place increased emphasis on using technology to help teachers use environmental education in the classroom.
- Construct the new Outer Banks Center for Wildlife Education at Corolla, and make headway on the development of the Centennial Campus wildlife center.
- Increase the circulation of ***Wildlife in North Carolina***. Find ways to make the magazine more useful, especially to educators.
- Do more to make educational materials available via the Internet, in keeping with the Wildlife Commission's goal to provide low cost materials.

MELISSA McGAW

Hands-on conservation-education activities are offered as part of the N.C. WILD and N.C. CATCH programs.

Administrative Services

The Division of Administrative Services provides administrative and technical support to the N.C. Wildlife Resources Commission in the areas of accounting, purchasing, human resources and management information systems. The division also administers the sale of hunting and fishing licenses and the registration and titling of boats to the public. Administrative Services is improving the services it provides to the Commission and the public as technology is used to make operations more efficient.

One example of how the division is improving its services to the public can be found in the changes that have occurred in the Customer Support Services Section. This section is responsible for the sale of hunting and fishing licenses, registration and titling of vessels, the sale of *Wildlife in North Carolina* and N.C. WILD Store products and administration of more than 1,000 wildlife service agents. In the past few years, an automated computer system has been introduced that allows agents to sell licenses and handle vessel transactions statewide through point-of-sale computer terminals. In the last biennium, the sale of subscriptions to *Wildlife in North Carolina* was also added to this system. Those purchasing their hunting or fishing license can now buy a subscription at the same time.

LEONARD LEE RUE III

The introduction of wild turkeys in all 100 North Carolina counties has increased hunter satisfaction.

Other accomplishments during the biennium are listed below:

FINANCIAL MANAGEMENT

- Implemented, in conjunction with the Purchasing Section, a new accounting system that has enabled us to become more timely and accurate in processing invoices for vendors.
- Designed and implemented a new Internet-based Federal Aid Management & Reporting System (FAMRS). The system allows field personnel to input properly coded activity reports and federal accountants to properly track federal project costs.

PURCHASING/WAREHOUSE

- Implemented an on-line purchasing system to improve efficiency by allowing field personnel to initiate purchasing requisitions electronically. A time-limited position was made permanent to assist the section in handling the increased workload, training and problem solving, and to provide technical assistance.
- Constructed a new building on warehouse grounds to provide additional storage space. Replaced the fence around the warehouse grounds to provide additional security, and implemented a new software program for tracking inventory.

CUSTOMER SUPPORT SERVICES

- Assumed the responsibilities of the technical help desk.
- Introduced the sale of *Wildlife in North Carolina* magazine via point of sale agents across the state.
- Simplified the license process by introducing a new license stock.
- Instituted on-going performance manage-

ment and customer service training.

- Implemented a new software package for fulfilling subscriptions to *Wildlife in North Carolina* magazine and orders for N.C. Wild Store products.

SYSTEM TECHNICAL SUPPORT

- Rewrote a number of computer applications in preparation for Y2K.
- Redesigned the Lifetime License postcard system to streamline costs and fulfillment.
- Hired permanent staff for network management and database administration.
- Stabilized the Wildlife Commission's network and related software.
- Prepared a request for proposal (RFP), reviewed bids and handled technical aspects for the redesign of the Commission web site.

HUMAN RESOURCES

- Studied law enforcement salary equity.
- Reorganized duties in the Human Resources Section.
- Delivered training on new policies to the field staff near their work location.
- Completed the Wildlife Commission safety and health manual.

MELISSA McGAW

Point-of-sale computer terminals have simplified the process of purchasing hunting, fishing and trapping licenses for sportsmen throughout the state.

goals *for the* new biennium

- Establish an intranet within the agency to provide an effective means of communicating information to Wildlife Commission employees.
- Consolidate and effectively move Wildlife Commission operations to Centennial Campus on the grounds of North Carolina State University.
- Streamline cost centers in the accounting system.
- Transition mainframe applications from Information Technology Services to the Wildlife Commission's internal network.
- Move current business practices toward e-commerce.

Financial Reports

Revenues July 1, 1998 – June 30, 2000

ENDOWMENT FUND	Interest	Principle
1998-99	$3,107,265.92	$1,713,227.92
1999-00	$2,941,466.56	$1,802,808.85
TOTAL INTEREST AND PRINCIPAL	$6,048,732.48	$3,516,036.77

SPECIAL REVENUE FUND	1998-99	1999-00
Hunting & Fishing License	$14,483,285.64	$14,065,689.94
Motorboat Registration	$2,651,740.00	$2,666,408.00
Watercraft Titling	$357,458.00	$333,106.50
Federal Funding	$7,468,623.05	$7,289,042.00
Transfer - Revenue (Nongame Checkoff)	$342,299.47	$325,348.31
Transfer - Revenue (Sales tax)	$9,978,875.16	$11,042,952.76
Transfer - Revenue (Gas tax)	$1,325,011.00	$1,323,205.00
Transfer - Dept. of Environment and Natural Resources	$1,406,481.00	$1,406,481.00
Transfer - Dept. of Transportation	$111,025.00	$12,750.00
Transfer - Dept. of Administration	—	$6,002.50
Transfer - Endowment Fund	$1,315,373.00	$1,855,359.00
Transfer - Dept. of Justice	—	$26,867.54
Transfer - Crime Control & Public Safety	—	$62,236.00
Transfer - Capital Improvements	$26,009.65	—
Sale of Publications	$566,984.48	$515,730.11
Sale of Timber Products	$1,271,225.73	$628,315.35
Sale of Surplus Property	$107,165.44	$121,298.61
Fees, Licenses & Fines	$55,376.27	$140,344.86
Food & Vending	$21,932.43	$17,974.78
Professional Services	$329,899.84	$118,737.37
Other Sales of Goods & Services	$154,179.27	$206,696.88
Reimbursement - DENR	—	$149,000.00
Reimbursement - DOT	$656,304.50	$215,000.00
Reimbursement - Misc.	$10,745.91	$14,516.14
Rental of State Property	$44,969.54	$11,930.55
State Grant - DOT	$30,000.00	—
State Grant - Clean Water Trust Fund	$403,770.50	$5,260,527.83
State Grant - National Heritage Trust Fund	$953,350.00	$2,396,448.00
Beaver Damage Control - County Funds	$156,000.00	$260,000.00
Local Funds	$164,070.93	$27,906.64
Interest Income - Short Term	$571,714.10	$584,540.83
Private Donations & Gifts	$95,057.42	$116,218.52
Miscellaneous	$116,598.29	$279,711.40
TOTAL REVENUES	$45,175,525.62	$51,480,346.42

Commission Facts

- The N.C. Wildlife Resources Commission was authorized by the General Assembly in 1947 and is charged with regulating and managing hunting, fishing, trapping and boating in North Carolina.

- The Commission has a staff of 514 employees throughout the state.

- The Endowment Fund was established in 1981. On June 30, 2000, it had a market value of $41,826,464.95. The Fund is supported entirely through the sale of lifetime licenses, lifetime magazine subscriptions and contributions, and only the interest can be spent to support the agency's many programs.

- The Pisgah Center for Wildlife Education has drawn more than 200,000 visitors since its opening in 1997, and two new centers are in the planning stages at the Centennial Campus of N.C. State University in Raleigh, and at Corolla in Currituck County.

- The Wildlife Enforcement Division certified more than 14,000 hunter education students annually during the past two years.

- Since 1970, the Wildlife Management Division has released 5,367 wild turkeys on nearly 350 restoration sites across the state.

- The Wildlife Management Division manages 1.8 million acres of public hunting, fishing and trapping through its Game Lands Program.

- The Division of Inland Fisheries produced and distributed more than 4 million warmwater fish, 1.3 million catchable trout and nearly 600,000 fingerling trout in support of agency programs in the last two years.

- The Division of Inland Fisheries restored almost 10,000 linear feet of trout streams during the biennium. Stream restoration involves obtaining conservation easements on degraded stream banks and restoring the stream corridors to high quality aquatic and riparian habitats.

- The Division of Engineering Services operates and maintains over 185 public boating access areas across the state.

MELISSA McGAW

"The state's continued growth has made the Wildlife Commission more aware of the importance of restoring habitats and creating new ones."

the proving grounds

Forest stewardship biologist Bill Edwards won't recommend management practices that he hasn't tried himself.

written by Mark Megalos ©2001
photographed by Melissa McGaw

Bill Edwards, *a biologist with the Wildlife Commission, disks an area for planting on his property.*

Halfway between Durham and the rural wilds of Rougemont, I had a chance to visit a true wildlife management master in his living studio. I came to see for myself the planted pastels and greenery that Bill Edwards has used to transform his family home into a haven for songbirds, quail and rabbits. It's a rustic, 20-acre homestead, yet largely cleared by tractor and chain saw and the help of a few friends. I hoped to learn about the successful conversion of an old Piedmont bombing range into very productive small-game habitat.

It was midsummer, and the plants of the Piedmont were showing signs of stress from a combination of excessive heat and erratic rainfall. We drove up an unimproved county road, a slightly improved gravel drive that wound through a power line right-of-way. And it was there that I caught the first glimpse of the wildlife plantings and vegetation work that made the property unique. I guess the biggest difference between this property and the many farms and pastures we had seen throughout the day was its weedy look—perfect for wildlife.

Resourceful is the first word that comes to mind in describing Bill, who is equal parts wildlife biologist, farmer and woodsman. To appreciate how he came to be that way, you have to know about what makes him tick. He's presently the Wildlife Resources Commission Piedmont biologist for the Forest Stewardship Program. Bill spends most of his days working directly with landowners to recommend habitat improvements for wildlife, with one special twist: He won't recommend anything that he hasn't tried himself. It's this dedication to successful wildlife management practices that sets him apart from most of his peers.

The 20-acre property is forested with an oak-pine hardwood stand approximately 55 years old. Half a century ago the property was used as a mortar and artillery range, and later as National Guard practice grounds. Recently, the property was opened up for sale to the public, and a midlife change was also coming to the mixed pine-hardwood forests. The shifting agricultural history of the Piedmont is easy to reconstruct from the pure pine stands that demarcate old agricultural fields. Old pastureland is now hidden in the shaded hardwood stands of white and red oaks and poplar. Hardwood stands of almost pure oaks are believed to be the result of uncontrolled wildfire and grazing. Also, these areas were unappetizing to livestock, and aggressive sprouting ability led to the oak stands that predominate today.

***Edwards—through** his own trials and errors—knows which practices are cheapest, easiest and will produce the best results for landowners.*

An Early-Succession Master

On his property, Bill makes a point of testing each and every combination of vegetation management—plowing, disking, bush-hogging and planting—before ever suggesting it to private landowners. The reasoning is sound: recommend the cheapest, easiest, practice that will work for landowners in the Piedmont.

"In my job, I have access to many private landowners and professionals that work with them," Edwards said. "If I can demonstrate cost-effective wildlife management techniques that work, I can have a real impact."

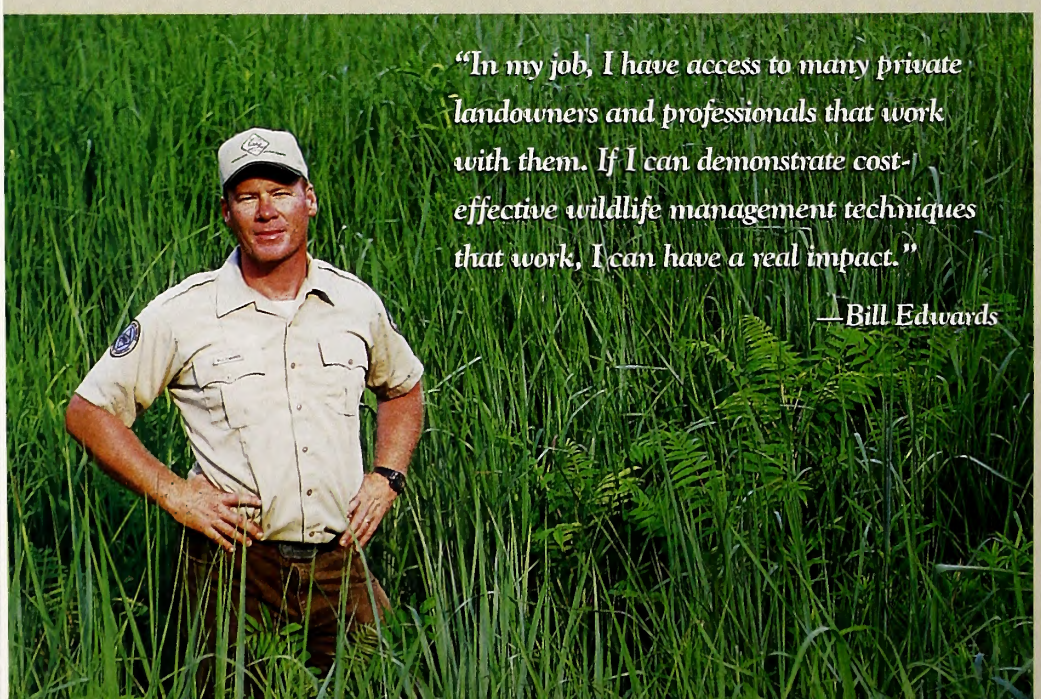
That philosophy is key to Bill's acceptance as a Forest Stewardship biologist by his peers in the other agencies that work side by side with him.

Bill's handiness around the farm is also evident in his handiwork. Hurricane Fran, in 1996, left many mature red oaks on the ground. Ever the practical and prudent one, Bill made the best of the hand dealt to him. He hauled the logs to a local sawmill. Right next to the tractor shed sits a new red oak planked barn that is a monument to the trees he lost during Hurricane Fran.

Teamwork

Lest you think Bill is a one-man dynamo, you need to realize that even he must check in with and often get permission from the boss. It turns out that his wife is also a wildlife biologist by training. Jennifer rules gently yet authoritatively over the management domain in subtle ways.

Bill's latest foray is into edge management. His first project was to create a small scallop in the existing treeline, saving (soft mast) fruiting and flowering shrubs. Luckily for Bill and the wildlife on the property, he has a few hundred feet more of chainsaw work left to do in the next year to maximize the ability of his forest edge to provide for wildlife.



Opening Up the Woods

Of the 14 acres of forest on the property, Bill has had the most impact in an old mixed stand of shortleaf and Virginia pine. Bill is an unabashed quail enthusiast and on his property the pines stood to benefit quail most—if he could get them into shape.

"There's one thing about quail," he said. "You've got to disturb the vegetation repeatedly and frequently, because after one to two years, many habitats lose the ability to support quail. It's really a labor of love. You can choose among methods—planting, disking, burning, harvesting, even spraying—but you've got to do something."

The pines naturally reseeded an abandoned farm field some time in the early 1940s, and have not benefited from the hand of a resource manager since. First, the cull trees needed to be removed. Normally, that would mean a commercial thinning. But that wasn't a viable option because of the small acreage and the lack of a local pulpwood market. So Bill fired up the chain saw and cut firewood. As for the small pines, he sawed them and laid them on the ground. Then, with a series of three prescribed burns, he started to create a Piedmont version of the south Georgia quail plantations—high, widely spaced pines with low grass and forbs below.

Fran-Redirected Management

The mark of a true resource manager is not just the day-to-day manner in which he works, but also how he handles adversity. The damage left in the wake of Hurricane Fran helped to test Bill's creativity. At first it appeared that the mature hardwood stands that he was tending for acorn production had been ruined. Large clumps of trees lay crosshatched in several piles across the property. After salvaging all that he could, Bill reassessed the location and size of these serendipitous openings and thought that he could plant some clover and other cover that would enhance the habitat even more. He proceeded to have some of the debris pushed up and sowed the open areas in cover. The new "Hurricane Fran specials" have become active wildlife feeding areas nestled

The partridge pea (left) and lezpedeza (bottom right) are two plants that provide "home-cooking" for a variety of wildlife species.

among mature oaks, gums and poplars.

Hardwoods and Streamsides

But Bill hasn't got all of the vegetation management figured out yet. Hurricane Fran and other issues like water quality in areas adjacent to intermittent streams have him weighing his options. Protecting streamside vegetative strips of trees and the plant diversity within them is of great concern to all resource managers in this day and age. For Bill it's a matter of whether or not to use prescribed fire, its frequency and how far to let the fires burn. Based on his initial results he'll decide how to handle the hardwoods farther up the slope.

"There's still the issue of how to deal with the mature hardwood stands," he said. "I think I'm going to start some crop tree release within the mixed hardwoods that I have," he said. "I've got a mixture of mostly white oaks, with southern and even a few northern red oaks mixed in. I think I can start removing poorer trees around them to improve their growth and acorn production."

Adaptive Management

If pressed to describe Bill's style of management, I have to say it's a combination of practical and adaptive management. Bill uses the tools at hand and then assesses their success as he goes. Based on what he finds, he "tweaks" the next recommendation until he arrives at something that's successful and predictable. As he and his colleagues find better ways, these too become incorporated into the host of management options.

The challenges of the job never diminish, and there's an air of continuous improvement that would make even the most progressive business consultant envious. The bottom line is finding habitat improvements that work in a predictable, scientific manner. It's two-thirds science and one-third art.

Enlisting Neighborly Support

When not actively working on his own property or at work on Stewardship Forests throughout the Piedmont, Bill is trying to sell the stewardship approach to his neighbors. Acknowledging that his acreage can't be habitat for a significant number of wildlife species, Bill is trying to enlist neighbors to make a larger block of managed wildlife. The attractive point of his sales pitch is the fact that Forest Stewardship plans are based on the landowners' own objectives. So regardless of the landowners' goals for the property, they receive a plan that will get their property into a condition they desire. It's been a basic belief from the beginning of the program that people will do what's in their best interest—"enlightened self interest." It's a message that's spreading. And with a messenger like Bill Edwards, it's no small wonder that the Forest Stewardship Program is growing by leaps and bounds. ⊠

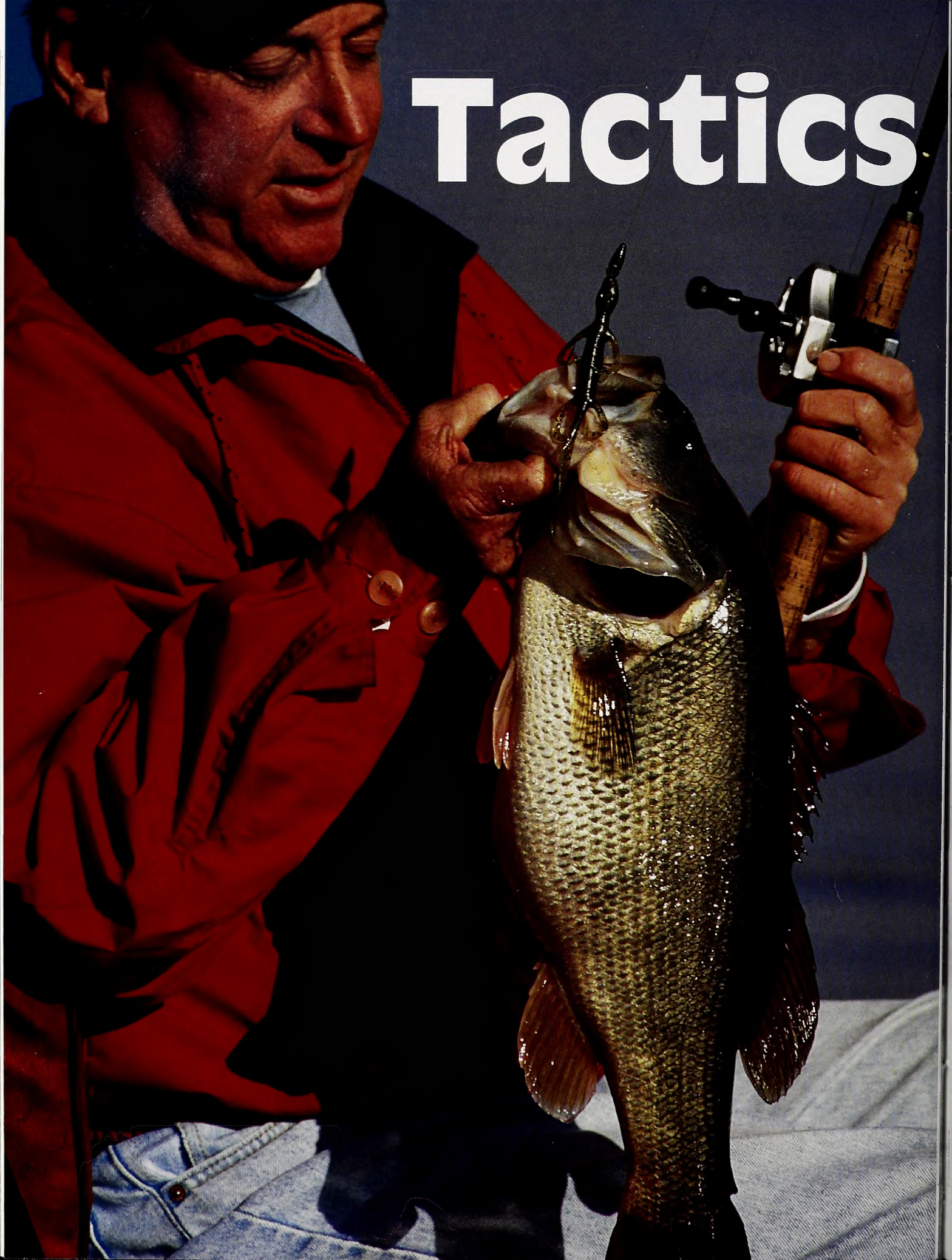
Mark Megalos is a forest stewardship forester for the N.C. Division of Forest Resources.

Wildlife-Friendly Plant Species

Queen Anne's lace – a large, fragrant white flower
Partridge pea – a delicate yellow flower that bears nutritious seed for quail and nongame birds
VA–70 Lespedeza – a small purple flower on a large shrub, popular with bees; plentiful throughout the summer with abundant seed for fall and winter quail feeding
Black-eyed Susan – brown, vivid yellow or orange flower petals that contrast with their dark centers
Sunflowers – giant relatives of the black-eyed Susans and asters; appeal to squirrels and all types of game and nongame species
Blackberries – bright white to slightly blue flowers followed by wonderfully tasty berries; a definite hit with all types of wildlife, including the human variety
Wild asters (Michaelmas daisies) – typically late-season bloomers, purples, violets, pink and white

On the Job with a Forest Stewardship Biologist

A Forest Stewardship biologist's job is not all fieldwork. There are office days on the computer, editing plans and drafting new wildlife prescriptions. There are training days to keep up with the latest information on warm-season grasses, instruction of new consultants to help carry the stewardship program to their clients, and a lot of driving to counties where Forest Stewardship is in high gear. Several days a month, Bill checks on the accomplishments of Forest Stewardship and helps process the paperwork needed to recognize landowners for the good resource work they accomplish on their property. If you'd like to find out more about the Forest Stewardship Program, call (919) 733-2162, Ext. 254. Or visit the Web address: www.dfr.state.nc.us/managing/forest_stewardship.htm



Tactics

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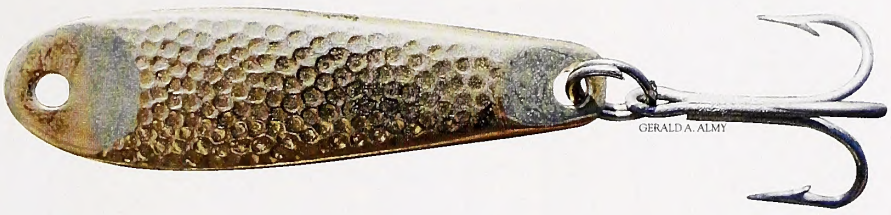


Cold-Water Bass

Bass may be slow and sluggish at this time of year, but that doesn't mean they're not biting. Here's how to get the best out of winter bass fishing.

written by Gerald Almy ©2001

The bitter east wind cut like a knife through our layers of down and wool clothing and rain gear. A low-pressure system hung gray over the land, and a steady drizzle wet everything in the boat before we reached the first fishing spot—a hump near the mouth of a major feeder arm on the lake.

We said little. It took all our energy to try to ignore the cold, dismal weather and concentrate on fishing. And evidently my partner did the best job of that. While I was crawling my jig-and-pork dressing back without so much as a tap, Bill suddenly leaned forward, whispered "There he is!" and lurched back in one fluid motion.

The boat rocked, and his rod bent double. Thirty minutes into the cold, winter fishing day, we were into our first bass. And what a bass it was. After a short but powerful struggle, my friend worked the fat, belligerent fish in close, and I scooped the net under 10 pounds, 10 ounces of thrashing largemouth. The fish was short, but immensely fat. He was less than 2 feet long, but almost round.

After calming himself, Bill took control of the electric motor, and we resumed crawling the jigs over the deep offshore structure. Before the day was out, a couple of small fish, plus a 7-pound, 8-ounce and an 8-pound, 13-ounce bass would come our way. Suddenly the sting of the 40-degree air and misting rain didn't feel quite so bad anymore. And if the three big bass weren't enough, we also added a pair of stripers to the catch. The numbers wouldn't compare with a red-letter day in spring, when fish are feeding fast and furiously, and catches are sometimes counted in the dozens. But for winter, we were thrilled with our luck in fooling five largemouths, three of them genuine "hawgs," and the bonus pair of stripers.

That's the way it is with cold-weather bass fishing. You might not rack up big numbers, but many days out, the size of fish you catch will more than make up for the shortage in quantity. And besides, it definitely beats no bass fishing at all.

But to score on cold-weather bass demands specialized tactics. The fish are often slow, and their sluggish metabolisms make them unwilling to chase after lures zipping along just under the surface. The fish are also found in specialized places during the coldest months of year.

When winter sets in for good, surface waters chill down first, and bass head for the depths. Water from 15 to 50 feet deep will hold most fish from sometime in late November or December through much of February. Structure at these levels is likely to hold the greatest number of fish. Look for creek channel edges, especially bends, bridge abutments, saddles, humps, deep main-lake points, brush piles, feeder mouths

A plastic lizard *or even a jigging spoon can take wintertime bass. The key is a slow, methodical presentation.*

JIM DEAN

***A wide variety of lures** will take cold-weather bass, but it's often hard to beat a heavy jig. Add a pork trailer and you've got an offering that can be fished with a creeping retrieve that even sluggish largemouths find irresistible.*

and thermal discharge areas where power plants release warm water into lakes.

Though the depths are usually the best place to look for winter bass action, at times when a warm trend sets in for several days, fish may move up into shallow water, even in December or January. This will be a short-lived phenomenon in most cases, but it can provide some exciting fishing if you hit such a southerly wind flow and find fish in the shallows. For this type of fishing, look for most bass on the northwest shore, where they receive the most warming effects from the sun. Your best bets are around cover such as large rocks and ledges, and docks or boathouses that absorb heat and transmit it back into the water, as well as around logs and brush. Underwater springs can also bring in water slightly warmer than the rest of the lake. And different sections of lakes often register different temperatures. A good thermometer is a worthwhile investment, either an electric or a hand-held model. If the water in one section of a lake registers 48 degrees and in another 46, the warmer area should definitely draw most of your fishing efforts.

Besides concentrating on these locations, also search for baitfish. They don't feed as much in winter as in spring and summer, but bass will definitely concentrate where forage is available. That way, when hunger strikes, the bass don't have to go far to find something to eat.

Finally, before getting started, keep in mind that the sun often governs when bass bite best during winter. There may be a bite just after dawn, but often the best action will take place from around 10 a.m. until 3 or 4 p.m., when baitfish activity, along with the water temperature, heats up. Just a slight increase in the temperature of the water during the day can increase the movement of baitfish and stir bass to feed.

A surprisingly wide variety of lures will take cold-weather bass, but if forced to choose one offering for this time of year, it would be hard to top a jig dressed with a pork frog, lizard, crayfish or eel. This combination offers an alive, "meaty" looking mouthful to bass, and it can be fished with a creeping retrieve that largemouths find irresistible even though their metabolisms are running slow. The heavy jig gets the offering quickly down to the bottom, where most fish are holed up in the frigid weather, yet the pork chunk keeps it from falling too fast and incites many strikes "on the drop."

Both rubber-skirted and hair jigs are effective, with the latter particularly good if smallmouths are present along with largemouths. Weights of 1/8 to 3/4 ounce are useful. Good colors include black, brown, blue and purple, with black generally getting the nod. Pork should be stocked in several colors including red, purple, blue, black and brown.

Cast the lure out to likely deep-water cover or near protruding rocks, boathouses or points, if there's been a warming trend, and allow it to sink with slack. Watch the line carefully, and if it twitches or stops sinking, set the hook. If a hit doesn't come on the drop, begin a molasses-slow retrieve. If you think you're reeling slowly enough, cut that in half. Use very little or no rod motion. Simply wind slowly enough on the reel handle to maintain bottom contact. When you feel a bump or heaviness on the line, set the hook hard. This technique definitely requires patience, so you'll want to know from past experience or from good indications on a depth finder that you are in a prime spot that likely holds fish before trying this method.

Similar lures that work are grubs and tube lures. These work best in sizes from 1/8 to 3/8 ounce in colors such as smoke, clear with glitter, pumpkinseed, motor oil, chartreuse and black. They can be fished ultra-slow, like the jig-and-pork combination, or with a slightly faster lift-and-drop presentation.

Another good winter offering is a jig-spinner combo. These lures are particularly good if the water is a bit murky, because the extra flash and vibration of the blade help bass key in on them. Work them with a slow, smooth retrieve or a lift-and-drop presentation. Sometimes very small jig-spinners work

F. EUGENE HESTER

especially well in cold water. Pearl, white, chartreuse and black are good colors.

Thin minnow plugs are generally thought of as spring and summer baits, but if you use the versions with long lips, these offerings can be excellent during winter. The lips make them dive 8 to 22 feet, and that's often deep enough to dredge up winter largemouths. Four- to 6-inch versions are best, with silver, blue, black and gold making excellent colors.

Work these lures over medium to deep structure by casting well past the area you want to probe, then reeling down fast to attain the maximum depth. Once your plug is running deep, slow down the retrieve. A smooth and steady action is sometimes good, but at other times it pays to pause and jerk the lure with sharp sweeps of the rod and pauses in between. This latter technique is strenuous, and you wouldn't want to use it all day, but occasionally if fish are finicky, it can be a tactic worth trying.

For days during warming trends or as fish slowly start to move to more shallow water in February or March, suspending models of thin minnow plugs with short lips are excellent to try. These will dive only about 4 to 8 feet, but their suspending action makes them particularly good when fish are moving in the shallows and becoming aggressive. Work the lure with a reel-pause-jerk retrieve. This tactic accounted for a 9-pound-plus fish for me last spring, my best fish of the year.

Deep-diving fat-bodied crankbaits are also worth trying on winter bass. These will dive anywhere from 12 to 20 feet and should be reeled fast to obtain depth, then slowly and steadily cranked through suspected strike zones.

Metal blade lures are prime choices for winter outings because they sink extremely fast, letting you quickly reach depths of 15 to 50 feet, where winter bass typically hole up. Cast out and allow the lure to swing in an arch through likely zones, then lift and drop it back to the boat. Blades are great for ledge hopping, probing channel drop-offs and walking down points.

Another lure many people mistakenly label as a spring- or summer-only offering is the rattle bait or lipless crankbait. These lures are normally fished fast as searching lures over shallow flats and banks. Since they sink, though, you can really fish them as deep as you want, or as deep as winter bass require. Cast out, watch for strikes on the drop and let the lure go all the way to the bottom. Then begin a slow, steady retrieve. If that doesn't produce, reel back part of the way to the boat, then pause, allowing the lure to drop down like a wounded shad. This often triggers a following fish to strike. Don't be surprised if a big striper latches onto the lure instead of a bass, though.

Spinnerbaits can be fished much the same way if you use heavy models of 1/2 to 1 ounce and allow them time to sink. Although I wouldn't use these for fish at 30- or 40-foot depths, they can be very good for those warming-trend days and late-winter periods when largemouths are starting to move up a bit and become more active in water 8 to 20 feet deep. Slow roll them over brush and near rocks protruding from the water, boathouses and slowly tapering points.

The final type of lure useful for winter bassin' is often the first choice of expert cold-weather anglers—the slab or jigging spoon. Hammered or smooth metal spoons in weights of 1/2 to 1 ounce are usually best, with silver, nickel or gold finishes or painted blue, black or chartreuse-and-silver combinations.

You can cast these lures and retrieve them, but the best winter presentation is directly under the boat. Find either bait-fish, gamefish, prime structure or a combination of all three of these (best of all) on the depth finder, and then lower your lure to just above where you have marked fish, near the baitfish or just off the bottom. Raise and lower the rod tip anywhere from 12 inches to 3 feet. Be sure to lower the rod just barely faster than the lure falls, so it drops freely, but excessive slack doesn't form in the line. Most of the strikes you get will come as the lure flutters back down, but if you drop the rod tip too quickly, you won't be able to see or feel them as well and set the hooks quickly enough. Be ready to set the hook with just the slightest pause or sideways motion in the line's descent or the faintest tap. It may feel like a crappie bite, but chances are good a 5- or 6-pound bigmouth is holding onto your spoon ready to do battle.

Three or four fish like this for a day's effort will make you realize what those die-hards are doing out there when the wind blows and the temperatures hover in the 30s or 40s, leaving most people to slouch on a couch and watch football. You may not catch a lot of fish, but the quality of bass available more than makes up for any shortage in quantity. Give winter bass fishing a try this year, and I bet you'll agree. ⊠

F. EUGENE HESTER

You may not catch *a lot of fish in the dead of winter, but the quality of bass available more than makes up for any shortages in quantity.*

MASLOWSKI WILDLIFE PRODUCTIONS

North Carolina's Tree Squirrels

From the pine-studded Coastal Plain to the fir- and spruce-choked mountain peaks, three species of tree squirrels trade places as habitats change.

written by Roger Powell ©2001

The squirrels in the forest behind my house in the Piedmont are gray squirrels. I see them scramble from tree to tree and I find the cores of loblolly cones they have husked. When I camp at high elevations in the mountain forests, the squirrels I see are red squirrels. I watch them harvest cones in red spruces and Fraser firs. When I visit the remnant longleaf pine savannas in the Coastal Plain, I can observe fox squirrels bounding across the ground between trees.

What gives here? Why do I find different squirrels when I visit forests in different parts of North Carolina? The answer is that each of North Carolina's three tree squirrel species is best able to find food and avoid predators in its favored habitat.

Bushytail Heaven

In continuous hardwood forests, gray squirrels frequently travel through treetops and avoid traveling on the ground. Any healthy tree squirrel is agile and able to avoid predators easily in the treetops. On the ground, however, a squirrel is potential fox, bobcat or red-tailed hawk food. Watch a gray squirrel foraging on the ground; it is almost always within a hop, skip or jump of a tree. Sometimes, however, gray squirrels do venture away from trees to forage into openings, but only when the richness of food in the opening outweighs the risk of predation. A squirrel will retrieve large food items, such as walnuts or pecans that have bounced far from their trees, and carry them back to the shelter of the closest tree to be eaten. In contrast, they will eat a cluster of small seeds in the open, except for the very last seed, which the squirrel will eat in the protection of a tree.

Because they are residents of hardwood forests, gray squirrels eat acorns, hickory nuts, pecans, and nuts and fruits of other deciduous trees. The gray squirrels in my yard dine on

DERRICK HAMRICK

black cherries, holly berries and dogwood berries in addition to acorns. They eat mushrooms and truffle-like fungi that they dig from the ground. And they also eat seeds from loblolly pinecones and are acutely tuned to the ripening of the cones. When loblolly seeds begin to ripen, squirrels sever cones from branches and some fall with resounding "plops" to the roof of my house. Then I hear heavy squirrel steps cross my roof as the animal fetches a cone and takes it to a safe place where it strips back the scales one by one to expose the seeds.

Many critters compete with squirrels for nuts. Wherever tree squirrels, ground squirrels and flying squirrels share habitat, they compete. Deer, bears, turkeys and grouse also compete with squirrels for nuts, as do insects. Larvae of acorn weevils grow inside acorns, reducing or destroying the nutmeat, but gray squirrels can detect acorns infested with weevil larvae and will choose weevil-free nuts when nuts are abundant. They can also distinguish between acorns of the red and white oak groups.

After falling in the autumn, acorns of red oaks remain dormant during winter and germinate in the spring. The squirrels cache these acorns when they fall and eat from the caches during the winter. Acorns of white oaks, however, germinate in the fall so gray squirrels often eat them then; if squirrels do cache them, they remove the germ of each nut so it cannot germinate. When acorns are scarce, squirrels eat weevil-infested acorns and do not cache them because they might rot during the winter. Gray squirrels even eat the weevil larvae, gaining a little extra protein.

Land of the Boomers

High in the mountains, red squirrels also eat nuts. These small, rusty red, northern squirrels, also called "boomers," are found up the spine of the Appalachian Mountains and across northern North America in conifer forests. They eat acorns from the oaks scattered among spruces and firs, hemlocks and pines, and they eat hazels and other nuts. The

The red squirrel (left) *and fox squirrel (right) are tree squirrels that occupy very different habitats at different ends of the state. The fox squirrel commonly haunts the pinelands of the Coastal Plain, while the boomer scampers about in the high-elevation mountain spruce and fir forests.*

F. EUGENE HESTER

***One of the most** common mammals in the state is the gray squirrel (above). This squirrel ranges from the Coastal Plain to the Mountains and is tied to the state's hardwood forests, where it forages for acorns and nuts. Lacking pigment in its fur through a genetic accident, the albino gray squirrel (below) is rare but not unknown.*

MASLOWSKI WILDLIFE PRODUCTIONS

predominant seeds in their diet, however, are conifer seeds. So, as the hardwood forests give way to forests of spruce and fir at North Carolina's high elevations, gray squirrels disappear and red squirrels become the local tree squirrel.

Red squirrels and gray squirrels do many things in parallel, each in their own forests. Just as gray squirrels are good judges of acorns, red squirrels are good judges of cones and prefer cones with the most seeds available for the least amount of work. They prefer fir cones because they are larger with more seeds than spruce cones. And they most prefer cones from white pines, when they are available, because these cones are the easiest to open and yield even more seeds per cone. Red squirrels harvest hemlock cones only when they can find nothing else. These tiny cones provide little food.

Mushrooms, too, are important to red squirrels. Red squirrels eat them fresh and harvest them to dry. If you find a row of mushrooms on a branch high above the ground, you have found mushrooms that a red squirrel is drying for winter storage.

Red squirrel caches differ from those of gray squirrels, which hide nuts scattered across a wide area. Each red squirrel, in contrast, has only one or a few large caches of winter food, which contain cones and dry mushrooms harvested in the fall. Red squirrels vociferously defend their caches and the territory around them. Each squirrel knows its territory well and chases any trespassing red squirrel. And red squirrels announce territory ownership with a loud *chr-r-r-r-r-r-r-r-r* call that says, "This is my territory! Red squirrels stay away!"

Being smaller than gray squirrels, red squirrels can live by harvesting and caching cones and eating the small seeds in them. For gray squirrels, the costs of harvesting cones with small seeds exceed the gains. Where gray squirrels and red squirrels overlap in range, gray squirrels raid red squirrels' caches. Raiding a cache of cones is profitable because another squirrel did the work to harvest all the cones. Red squirrels cannot defend their caches against the bigger grays, but each red squirrel in our mountains tends to have several, small caches. Consequently, if a gray squirrel raids a red squirrel's cache, the red squirrel has not lost its winter food supply. Across most of the range of red squirrels, gray squirrels are absent.

Phantom of the Pinelands

North Carolina's third tree squirrel, the fox squirrel, is a resident of yet another habitat in a different part of the state—open longleaf pine and turkey oak forests and savannas in the Coastal Plain. These habitats were extensive before European settlement but are now scarce. The loss of habitat has caused fox squirrel populations to drop, and fox squirrels are endangered, threatened or critically limited across much of their range in the Southeast. Southeastern fox squirrels are big squirrels, much larger than gray squirrels, with distinctive black, white and gray markings.

The large size of fox squirrels is directly related to their use of open longleaf pine habitats. Widely spaced trees prevent arboreal travel, so fox squirrels must move considerable distances on the ground. Their large size enables them to go far to find food when it is scarce; fox squirrels sometimes arrive in isolated patches of longleaf pine miles from other patches. Large size is also advantageous in handling the longleaf pine's large, woody cones. The cone's seeds are a major food for fox squirrels. Finally, large size helps fox squirrels survive hot summers with little food. During June and July, they hole up in leaf nests or cavities in trees, saving energy by being inactive and living off stored fat. As soon as seeds begin to mature in green, longleaf pinecones, the squirrels begin harvesting cones and gain weight again.

Gray squirrels are unable to compete with fox squirrels in native longleaf pine habitats. The original forests that dominated the Coastal Plain of North Carolina had millions of widely spaced, old, longleaf pines, many exceeding 3 feet in diameter. Scattered among the pines were turkey oaks forming a sparse understory canopy some nearly 50 feet high. Acorns were too scarce, longleaf pinecones too large, distances between trees too great and summer food shortages too long for gray squirrels. Yet in today's young stands of longleaf pine, dense thickets of turkey oaks, the

result of years of fire suppression, enable gray squirrels to outcompete fox squirrels.

Divided by Habitat

Like the tree squirrels, other groups of closely related mammals subdivide North Carolina by habitat from the coast to the mountains. Three common species of wild mice are members of the white-footed mouse group: the cotton mouse, the white-footed mouse and the deer mouse. All members of this group are cute, nocturnal mice with big eyes and ears, brown backs, white bellies and furred tails that are distinctly bicolored with brown tops and white undersides. In the Coastal Plain, cotton mice live in bottomland hardwood forests and associated old fields. Across the Piedmont to low elevations in the mountains, white-footed mice live in hardwood forests, mixed hardwood-conifer forests and woodlots. In the mountains, deer mice live in northern hardwood forests and in the high-elevation spruce-fir forests. All of these mice have diverse diets that include seeds, fruits, green vegetation, and insects and other invertebrates. And all are good climbers that forage for fruits and seeds in brush and shrubs and even in trees. Yet each species is adapted better to the particular forests where it lives.

Southern and northern flying squirrels also subdivide the state, but not equally. Across most of the state, southern flying squirrels are common; northern flying squirrels are found only in the mountains at high elevations where spruce- fir forests replace northern hardwood forests. These mountain forests mark the far southern range of northern flying squirrels, which are common across Canada and in northern states.

The high mountains allow several other northern mammals to extend their ranges into North Carolina, and these mammals often have close relatives that are found elsewhere in the state. Hairy-tailed moles are found only at high elevations and never in the same place as eastern moles. The same is true for Appalachian and eastern cottontails and for red-backed and meadow voles. Although long-tailed weasels are found throughout the state, they are joined by least weasels only in the mountains.

The key to North Carolina's diversity of mammals is, of course, the diversity of its habitats. And these are caused by changes in topography—from the high mountains, across the Piedmont and through the Coastal Plain. Diverse groups of mammals have adapted to the diverse habitats, with members of each group trading places but living similar lives. ⊠

***Boomers and fox squirrels** differ in more ways than just the habitats they live in. The fox squirrel (below) is the largest tree squirrel in North America, ranging from 20 to 26 inches in length, while the elfin red squirrel may be half that size. Though both species eat acorns and nuts, they also favor seeds from different kinds of pines—longleaf pines, in the case of the fox squirrel, and white pines, in the boomer's case.*

MASLOWSKI WILDLIFE PRODUCTIONS

DERRICK HAMRICK

Thousands of double-crested cormorants return to North Carolina every winter from northern nesting grounds. That's just one kind of

Cormorant Comeback

written by Julie Dunlap ©2001 / *illustrated by Consie Powell* ©2001

ANCIENT ORIGINS

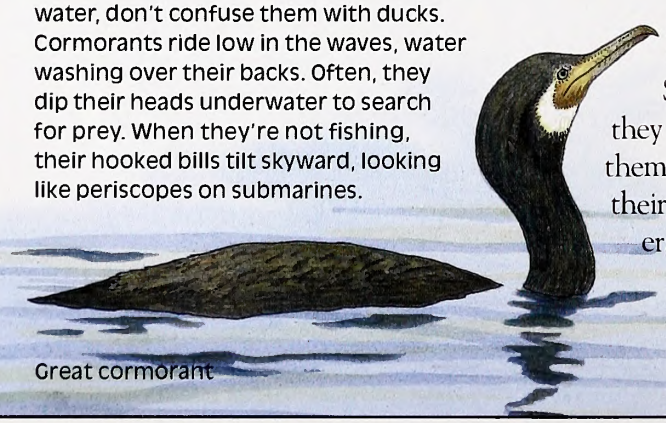
Dark, slim and snake-necked, cormorants look prehistoric. And they should. Like loons and grebes, cormorants first appeared on earth at least 70 million years ago. They are among the most ancient of all birds. Thirty-three species **evolved** over time, and today cormorants live along coastlines around the world. Great cormorants and, more often, double-crested cormorants are the two kinds seen in North Carolina. You may spot them flying overhead, in lines or V-formation, or perched on rocks and piers, wings outspread like black cloaks. They may remind you of feathered dinosaurs, but cormorants are perfectly **adapted** to the modern world.

UPS AND DOWNS OF DIVING

The word "cormorant" comes from a Latin phrase, *corvus marinus*, which means "crow of the sea." Some kinds of cormorants live only around salty sea water, but other species prefer fresh water. Double-crested cormorants are equally at home on rivers, lakes and seashores. Like crows, they flock by the dozens to favorite feeding sites. Cormorants are **opportunistic feeders**, eating small fish, snakes, frogs, even crayfish—whatever is easy to catch.

Some people call cormorants "submarine birds" because they dive so skillfully. For centuries, fishermen in Asia trained them to dive after fish (neck rings kept them from swallowing their catch). Unlike other water birds, cormorants have feathers that are not waterproof. The heavy, wet bird dives fast, propelled by large, webbed feet. With wings held tight against its body, a cormorant flies underwater. It usually surfaces to swallow its catch.

If you see a flock of cormorants on the water, don't confuse them with ducks. Cormorants ride low in the waves, water washing over their backs. Often, they dip their heads underwater to search for prey. When they're not fishing, their hooked bills tilt skyward, looking like periscopes on submarines.



Great cormorant

MAKING MORE CORMORANTS

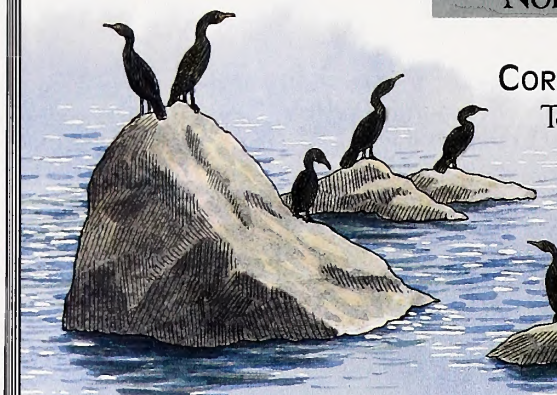
Most cormorants leave North Carolina by March, flying north to nest on rocky cliffs along the East Coast or on islands in the Great Lakes. A few double-crested cormorants stay in North Carolina, gathering to nest around lakes in April and May. **Colonial nesters**, their nesting-ground neighbors may include herons, egrets or gulls. It's a noisy place, with male cormorants croaking and grunting to attract mates. It's messy too. Both mates help build a rough platform of sticks, weeds, feathers and debris in a tree or on the ground. They may use the same nest year after year, coating the nest, tree, and ground with waste, or **guano**. Bluish-white, guano-stained eggs are warmed by the parents' webbed feet. The naked, blue-skinned nestlings are **altricial**, dependent on their parents to deliver food several times a day. Their cries, *cuk-hor-hor-hor*, cease only when a parent arrives to **regurgitate** fish into their beaks. By five weeks of age, the young leave the nest and roam the colony with other "teen-age" birds. At seven weeks, they are learning to dive after their own finny meals. Ten-week-old cormorants are ready to live on their own.

Adult cormorants feed nestlings by regurgitating fish into their beaks.

After diving, a cormorant usually leaves the water quickly. This double-crested cormorant will spend much of the day perched silently on dead trees, rocks or pilings drying its wings in the sun.

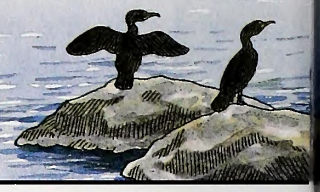
RECOVERY ROLLER COASTER

One hundred years ago, colonial nesting made cormorants, egrets and many other birds easy targets for hunters. Thousands of cormorants were shot for their feathers or for fish bait. Some people feared the birds would die out, but new conservation laws allowed their numbers to recover. Populations shrank again in the 1950s when insecticides such as DDT poisoned cormorants and other birds, thinning their eggshells so that few nestlings could hatch. It took a ban of the insecticide, in 1972, to rescue the birds.



CORMORANTS GALORE

Today there are more cormorants than anyone remembers before. Some folks even say that there are too many. Double-crested cormorants throng around catfish farms, snatching easy meals from the shallow artificial ponds. Around big nesting colonies, fishermen often blame cormorants for eating bass and other valuable fish. Scientists argue that the



What Does It Mean?

adapted: well-suited to a particular way of life through evolutionary changes in an organism

altricial: young birds that are helpless and usually blind and naked for a period after hatching

colonial nesters: birds that breed and raise young in groups with their own and sometimes other species

evolved: developed under environmental pressures over many generations

guano: excrement of cormorants and other seabirds

regurgitate: to throw up partially digested food

Read and Find Out

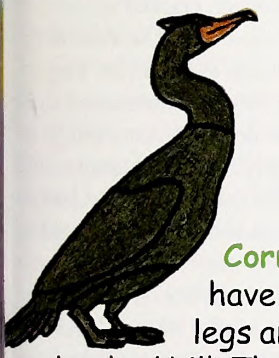
- "Beauty or Beast?" by Peter Steven, Birder's World, June 1997.
- *Cormorants, Darters and Pelicans of the World* by Paul A. Johnsgard, Smithsonian Institution Press, 1993.
- *Dangerous Birds: A Naturalist's Aviary* by Janet Lembke, Lyons & Burford, 1992.
- "I Fish With Birds" by Kun Yi and Jeremy Schmidt, Ranger Rick, February 1997.
- *Lives of North American Birds* by Ken Kaufman, Houghton Mifflin, 1996.
- *Seabirds* by Mark J. Rauzon, Franklin Watts, 1996.

Editing and design by Consie Powell.
Art puzzle by Anne Marshall Runyon.

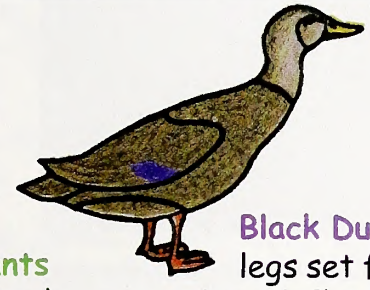
A Cormorant and Black Duck Puzzle

birds eat few of the fish people want, but angry fishermen disagree. On the Great Lakes, some fishermen wish the cormorant comeback would go away again.

Yet others call cormorants a conservation success story. The birds survived the changes that wiped out the dinosaurs and are adapting to the changes humans cause every day. People who admire the tough old birds say, "Welcome back, cormorants!"



Cormorants have set back legs and a thin, hooked bill. They dive for fish to eat.



Black Ducks have legs set forward and a broad, flat bill. They dabble in shallow waters for plants to eat.

Study these two water birds.

1. Copy the art.
2. Cut out all the body parts along the thick black lines.
3. Mix and match. . . Clothe a cormorant, dress a duck.

Can you create a goose too?

AMR

Get Outside

Become a Nature Reporter: The yearly return of thousands of double-crested cormorants to North Carolina is big news. Record what you see, noting when and where you find the birds. Then, like a good reporter, dig deeper. Search newspapers and the Internet for the latest scientific data on cormorants. Are their populations still growing? What's happening to their prey populations? What measures are used to control cormorant numbers, and do they work? How do people in different places feel about the birds? Why? Try to see all sides of the issue and think about how a good reporter would write about it.

Sharpen Your Observation Skills: Cormorants are great birds to help you learn to see better. Can you spot a great cormorant in a flock of double-cresteds? Can you tell if the birds overhead are geese or cormorants? What differences do you see between adults and juveniles? Take a closer look at photos of different cormorant species to learn how birders in the field can tell them apart. In a museum, you can even examine details such as cormorant feet. How do they differ from duck feet? What else do you notice about cormorants' bodies that helps them survive?

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Which Niche?: teaches students to define and understand ecological niches.

Changing Attitudes: teaches students how attitudes toward wildlife, the environment and natural resources change.

No Water Off a Duck's Back: teaches students to identify ways oil spills adversely affect birds and to understand other negative consequences from human-caused pollutants.

Neuse River Access Area Dedicated to Wildlife Commissioner

CHRIS POWELL

A new Wildlife Commission boating access area *was recently dedicated to Wildlife Commission member Gene Price (third from left). Also attending the dedication ceremony are from left: John Pechmann, Wildlife Commission chairman; Charles Fullwood, Wildlife Commission director; Gloria Price, Gene's wife; Bill and Carol Lane, who donated the property for the access; and Wes Seegars, Wildlife Commission vice-chairman.*

One of the Wildlife Commission's newest boating access areas was recently dedicated to a member of the N.C. Wildlife Resources Commission.

Price's Access Area Landing —named after Commissioner Gene Price—is located near Goldsboro, adjacent to the Sam Casey Bridge on the Neuse River. Bill Lane, a Wayne County resident who donated the waterfront property to the Wildlife Commission, said that the only condition was that the landing be named after his long-time friend.

"If you've ever needed anything to get done, you went to Gene Price," Lane said at the dedication. "This road wouldn't be here and this bridge wouldn't be here if it wasn't for Gene Price. I couldn't think of a better name for this access area."

The project represented a joint venture between the Wildlife Commission and the N.C. Department of Transportation (DOT), which granted access to the boat ramp. The Wildlife Commission's Division of Engineering Services constructed the single launch-and-entry ramp along with 20 parking spaces.

At the ceremony, Price said that considerable credit should go to Lane and his wife, Carol, who also contributed land to the state so that the road and bridge next to the access area could be constructed. "This is a truly historic occasion, not that the dedication is such a monumental event, but that I find myself speechless," Price joked. "But I am deeply touched by what Bill and Carol have done."

—Chris Powell

Edited by Chris Powell

Environmental Program Certifies 1000th Educator

The N.C. Department of Environment and Natural Resource's Environmental Education Certification Program recently reached a milestone, when the 1000th person became enrolled.

The participant who put the program over the mark was Kristine Zannelli, a student at Warren Wilson College, in Asheville, who is majoring in elementary and environmental education.

"I'm excited to be the 1000th enrollee and am looking forward to completing my certification soon," Zannelli said.

Initiated in 1996, the Environmental Education Certification Program establishes a standard for the education profession. The program is open to everyone and certified individuals are honored at a ceremony for Certified Environmental Educators.

"Whether the educator is a teacher, or someone in business or industry, certification assures employers that their employees are environmentally aware, involved in their communities and understand the importance of stewardship," said Libby Wilcox, manager for the Environmental Education Certification Program.

For more information about the program, call (800) 482-8724.

—Courtesy of the Office of Environmental Education

Mountain Forests Magazine Series Draw Passionate Responses

Editors' note: *Our series "Mountain Forests: A Wildlife Dilemma," in the September and October issues, sparked some lively responses from readers. Some of these letters appear below, edited to fit our space constraints.*

Dear Wildlife:

Our wildlife biologists are to be commended for their interest in species and habitat diversity. But a more balanced discussion would have better developed a point the writer barely touches on, namely the natural background rate of early succession creation in these forests. Forest ecologist Jim Runkle reports this rate to be around 1 percent annually in the Southern Appalachians. That figure does not include the larger, more infrequent disturbances caused by powerful storms, etc. Thus, any early succession created by human activities is additive and cumulative to that occurring naturally.

Early-successional habitats do offer benefits to wildlife during their five- to seven-year lifespan, such as soft mast foods; but they naturally succeed into a relatively undiverse phase that is home to far fewer species and lasts for decades. But the implication that early succession species will become extinct without human intervention is far from achieving scientific consensus.

An additional problem does emerge, however, through the oft-heard argument that extractive and intensive human manipulations—like clearcuts and shelterwoods for the timber market—are equivalent to what is provided through natural disturbances such as fire and windthrow. This is exactly the conclusion some readers will draw from the writer's piece.

We need to take care in proposing management scenarios that we don't trade one man-made problem for another. Are golden-winged warblers in decline because their habitats are now more rare? Or are we witnessing, along with recovering forests, the natural retreat of a species that got an unnatural foothold following the period of industrial logging earlier this century? Perhaps it's safest to admit that we don't know all the effects of our ecological tinkering, and do our best to restore the ecological processes —such as fire—on which forests and our own lives depend.

—Susan Andrew, ecologist
Southern Appalachian Forest Coalition

Dear Wildlife:

I read with great interest your article on early-successional mountain forests in the August issue of your magazine. You did an excellent job of portraying the importance of young forest habitat. You also interviewed the right people—the field biologists who understand the dynamics of habitat and wildlife better than anyone.

Populations of songbirds and other wildlife that need young forest habitat are declining at an alarming rate in the southern Appalachians. Only through thoughtful, professional forest and wildlife management will we be able to reverse this trend and insure that habitat for all forest wildlife is maintained over the long haul. Your factual, common sense, science-based article is exactly what is necessary to help folks understand that all forests, young and old and everything in between, are vitally important to North Carolina wildlife.

We encourage you to continue to provide this important information in your magazine.

—Mark Banker,
regional habitat biologist
Ruffed Grouse Society

Dear Wildlife:

The issue of early-successional forests is one that seems lost on hunters in general. Many will tell you they never shoot a deer on a clear-cut site, but they fail to realize without early-successional forests and openings the deer populations would be much smaller than they are now.

Such issues may explain why managed national forests such as the Chattahoochee in north Georgia have higher black bear densities than unmanaged forests such as the Great Smoky Mountain National Park.

Keep up the good work.

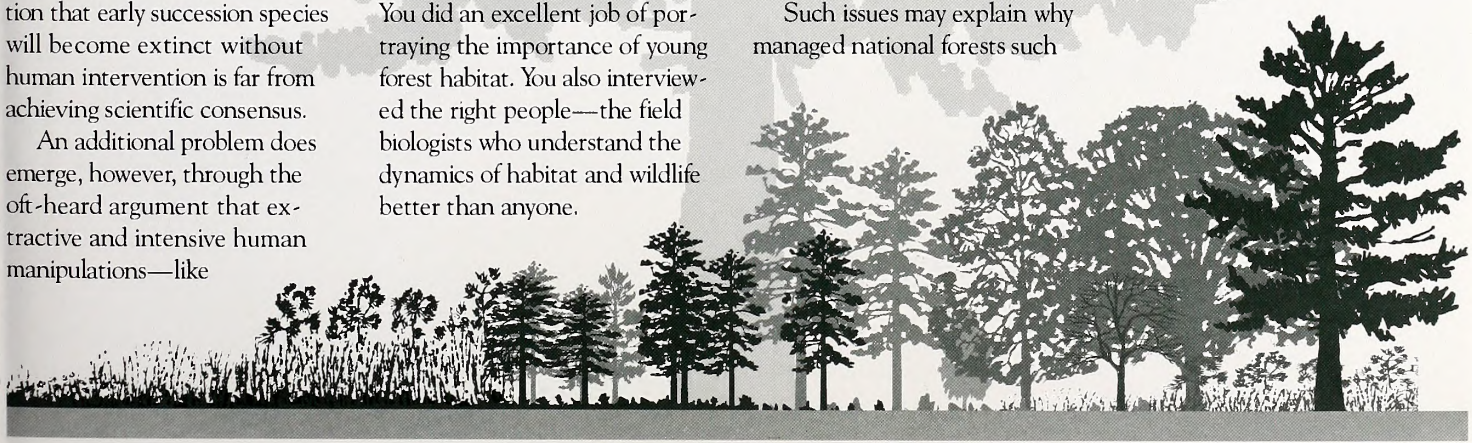
—Charles Coleman,
Suches, Ga.

Dear Wildlife:

It is about time that someone took a reasonable look at good environmental policy and left off the "big trees are always best" ethic. It is sad that many university professors don't get into the field enough to realize the harm that has already been done to all early-successional species in the Southeast. It is also sad that they do not look at energy (primary productivity) long enough to understand that we are slowly strangling our own energy windpipe by shutting down early succession.

Hooray for telling the other side of the story and leaving off the emotionalism and sensationalism.

—Terry Seehorn,
environmental science educator



North Carolina Outdoor Calendar of Events

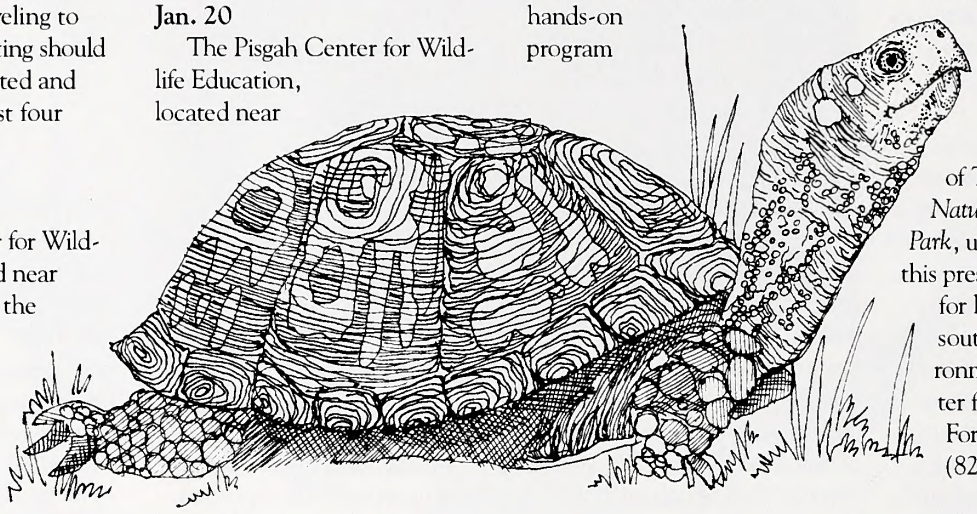
On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Jan. 13

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Turtle Talks program from 2 to 3:30 p.m. This is an entertaining and educational discussion of reptiles. Participants will see live turtles, lizards and snakes. For more information, call (828) 877-4423.

Jan. 20

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Fish Tales program from 1 to 3:30 p.m. Program participants ages 12 and up will participate in a hands-on program focusing on fish anatomy, including how and what they eat, how and why they grow scales and how they breathe. For more information, call (828) 877-4423.



Jan. 27

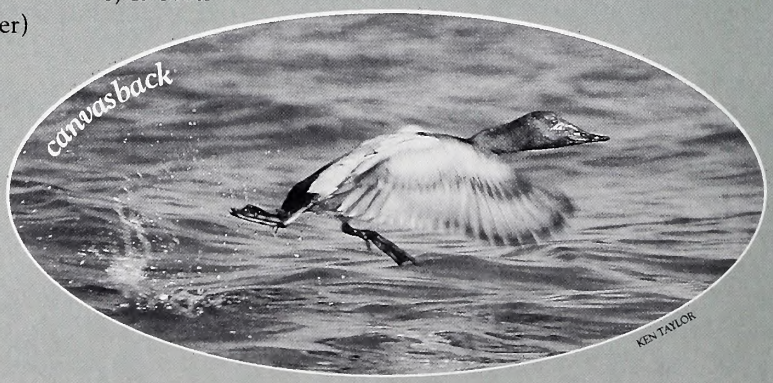
Dan Pierce, author of *The Great Smokies: From Natural Habitat to National Park*, uses the Great Smokies in this presentation as a case study for human impacts on the southern Appalachian environment at the Pisgah Center for Wildlife Education. For more information, call (828) 877-4423.

2000-2001 Bag Limits, Shooting Hours and Season Dates for Waterfowl

BAG LIMITS

Conventional bag: Six ducks with no more than one black duck, four mallards with no more than two hen mallards, two wood ducks, two redheads, three scaup, four scoters, one fulvous tree duck, one mottled duck, one canvasback or one pintail. The season on harlequin ducks is closed. (Possession limits are twice the daily bag unless otherwise noted.)

Other Limits: a) 15 snow & blue geese, no possession limit
b) two brant
c) five mergansers (one hooded merganser)
d) seven sea ducks (four scoters) In special sea duck areas only
e) 15 coots



SHOOTING HOURS

One-half hour before sunrise to sunset.

SEASONS

Ducks, Mergansers & Coots: Through Jan. 20

Sea Ducks: Through Jan.20

Snow & Blue Geese: Through March 10

Brant: Through Jan. 20

Swan: Through Jan. 31 (By permit only)

Youth Waterfowl Day: Jan. 27, 2001 Youths must be 15 years of age or younger and accompanied by an adult at least 21 years of age. Species include ducks, mergansers and coots. The adult may not hunt these species.

You may also call 1-800-675-0263 for this information.
Report all bands by calling 1-800-327-BAND.

Commission Wins Award for State Fair Exhibit

The N.C. Wildlife Resources Commission won first place for Best Non-Commercial Exhibit at the State Fair, in Raleigh, making this the third year in a row the agency has received the award.

The Commission's theme for its exhibit was "After the Storm: Nature's Resilience." Displays within the exhibit included photographs, text and habitat re-creations depicting nature's ability to recover from severe meteorological events.

Former Agricultural Commissioner Jim Graham visited the exhibit, presenting the award to Keith Hendrickson, a Wildlife Commission fisheries technician, who supervised design and construction of the exhibit.

"This is a fine exhibit," said Graham, who recently retired after nine terms and 36 years as state agricultural commissioner. "You just can't put a value on what the Wildlife Resources Commission's exhibit does year after year to educate the public."

CHRIS POWELL

Fisheries Technician Keith Hendrickson, *who supervised construction of the exhibit, receives the plaque for Best Non-Commercial Exhibit at the N.C. State Fair from former Agricultural Commissioner Jim Graham. Also present is Richard Hamilton, assistant director of the Wildlife Commission.*

Some of the featured displays depicting nature's ability to recover from severe weather included photos of Wildlife Commission enforcement officers involved in post-Hurricane Floyd rescue efforts, a recreated pine forest damaged by the storm and a display of a flooded coastal stream.

—Russell Wong

Field Notes

Mourning Dove	Through Jan. 15
Red & Gray Squirrel	Through Jan. 31
Fox	See *Regulations Digest*
Raccoon and Opossum	Through Feb. 28
Ruffed Grouse	Through Feb. 28
Bobwhite Quail	Through Feb. 28
Bobcat	Through Feb. 28

Information on bag limits, either-sex deer season and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

On Patrol

Editor's note: *The situation below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

Senior Officer Joe Story received a call about a man holding a large timber rattlesnake, while trying to flag traffic down in the Avery Creek area, in Transylvania County. The officer drove to the location and, sure enough, found the man standing on the roadside holding the live rattlesnake by the tail. The subject told the officer that he had seen the television series "The Crocodile Hunter," where the host caught dangerous snakes by the tail, so he thought he'd try it. The fellow added that he thought the Forest Service district ranger would like to keep the snake for an exhibit, so he was trying to hitch a ride to the ranger station. Officer Story noticed alcohol on the man's breath and that—plus the act of holding an extremely agitated, venomous snake—prompted the officer to inquire how much the man had had to drink. The man replied that he had consumed one drink of alcohol—a very large one. After convincing the man that the ranger station had no use for a snake on display, the snake was released on its own recognizance. (Moral of the story—don't try this at home.)

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through October 2000

Principal Balance
$30,921,044.53

Interest Earned
$32,013,754.99

Total Receipts
$62,934,799.52

Interest Used
$20,436,178.04

Fund Balance
$42,498,621.48

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

January Improvements

by Rodney Foushee

Here are a few ways you can help fish and wildlife on your property this new year.

Conservation Tax Credit: North Carolina's Conservation Tax Credit program not only provides a way to save on taxes—something everyone enjoys—it also helps you permanently protect fish and wildlife habitat on your land.

This flexible program provides a state tax incentive to protect the environment through donations or conservation easements on private land. This could include donations of riverfront property or easements on your favorite hunting land.

In North Carolina, the Conservation Tax Credit is 25 percent of the value of the property or conservation easement. And the state has generous limits on the tax credit. Currently, the limit is $250,000 for individuals and $500,000 for corporations. All applications for certification of the state Conservation Tax Credit must be made with the N.C. Department of Environment and Natural Resources. For more information about the tax credit program, contact Bill Flournoy at (919) 715-4191.

Consider Ugly Farming: With the harvest well over and things slow on the farm, resist the temptation to fire up the bush hog and clean out those brushy ditch banks and fence rows. This may improve the appearance of your property, but small-game populations will really suffer.

Instead consider leaving field borders and edges unkempt for wildlife. The weedy edge along ditches and fences serves as a windbreak, as well as supplying excellent food and cover for rabbits, quail and songbirds.

Join Project FeederWatch: Project FeederWatch is a winter-long survey of birds that visit feeders at backyards, nature centers, community areas and other areas throughout North America. Through the program, volunteers of all ages count the highest numbers of each species they see at their feeders from November through April. Project FeederWatch is sponsored by the Cornell Lab of Ornithology and helps scientists track broad movements of winter bird populations and long-term trends in bird distribution and abundance.

Though this year's survey has already begun, you can still join the project and start receiving the quarterly issues of *Birdscope* newsletter to learn all about birds and this exciting program. For more information about Project FeederWatch, contact the Cornell Lab at 1 (800) 843-BIRD or check out the lab's web site at http://birds.cornell.edu/.

N.C. WILD STORE

NEW!

The third poster in our "Sporting Heritage" series...

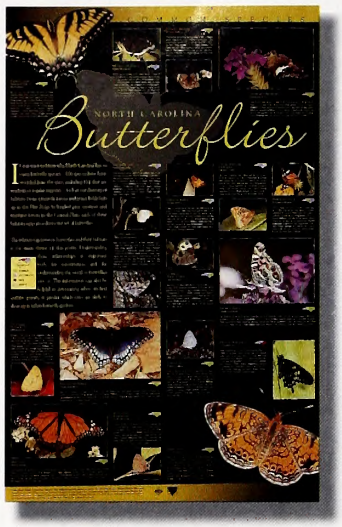
SPORTING DOGS OF NORTH CAROLINA
Pointing and Retrieving Breeds

Setters, retrievers, pointers and spaniels—these loyal companions fascinate us with their instinctive ability to point or flush and retrieve upland birds and waterfowl. This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds in striking color. Each portrait includes a description of the breed's habits and history, making this handsome poster useful for reference and for show. (The second poster in this set will present trailing and treeing breeds. Look for it later this year.) See our other "Sporting Heritage" posters on page 62. **$10.** ITEM CODE **P18**

Order this item—and all N.C. WILD Store products—online.
www.ncwildlife.org

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE



Rare North Carolina Butterflies
$8. ITEM CODE P16

Common North Carolina Butterflies
$8. ITEM CODE P15

Butterfly Posters Set
$14. ITEM CODE P17

We've chosen a brilliant selection of rare and common butterfly species for these two posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats. 22" x 34".

Amphibians of North Carolina
The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.
ITEM CODE P11

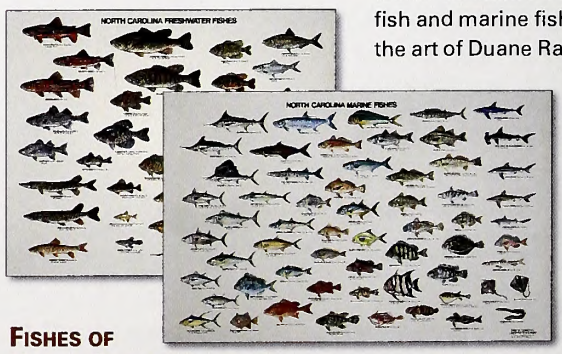
Amphibians of North Carolina
True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.
ITEM CODE P14

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina
Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18.
ITEM CODE P10

Waterfowl Decoys of N.C.
Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE P12

Traditional Trout Flies of the Southern Appalachians
Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE P13

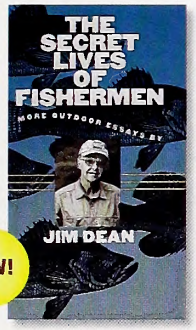


North Carolina's freshwater fish and marine fish featuring the art of Duane Raver.

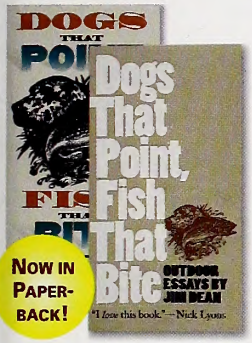
Fishes of North Carolina
Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.
ITEM CODE P9

The Secret Lives of Fishermen

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound $24.95. ITEM CODE **M13**



NEW!



NOW IN PAPERBACK!

Dogs that Point, Fish that Bite

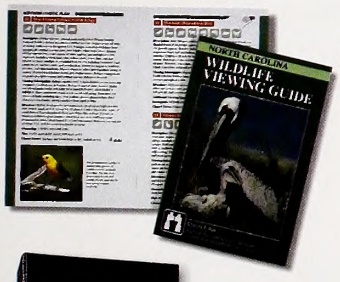
Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.
Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**

Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20.
ITEM CODE **N9**

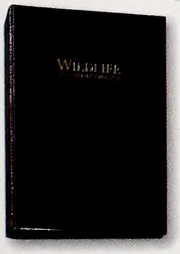
All Things Are Connected

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic. $22.
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**



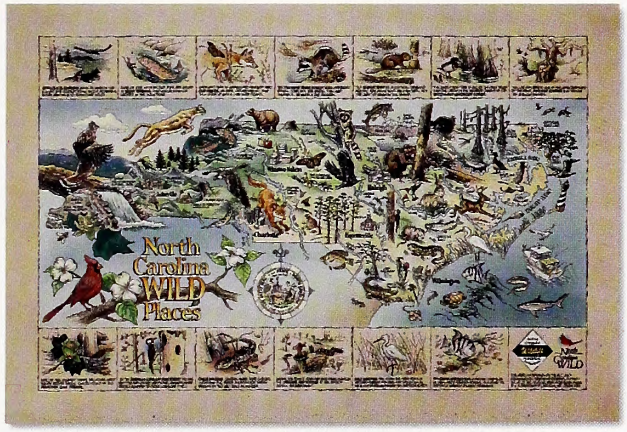
Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10. ITEM CODE **M2**

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.
ITEM CODE **M6**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

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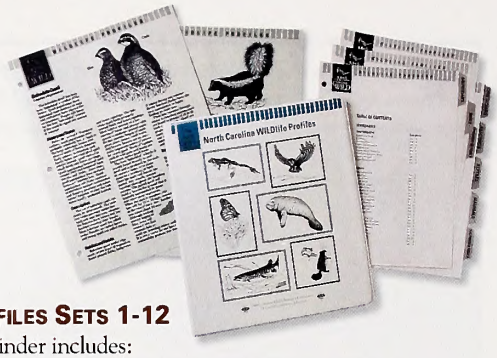

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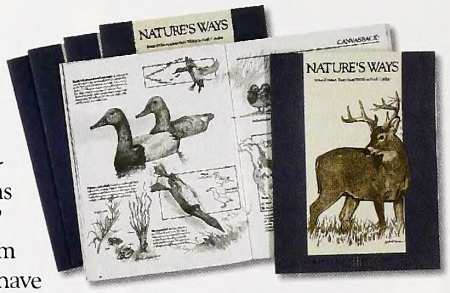

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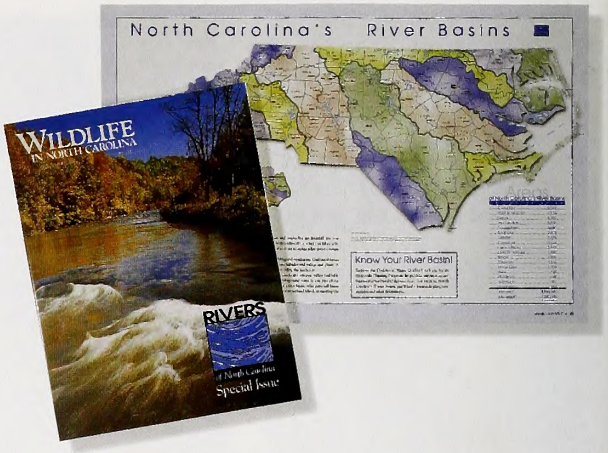

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The money is also used to help North Carolina meet its obligations in implementing the North American Waterfowl Management Plan, the international agreement designed to help restore waterfowl populations throughout the continent. In addition, funds have been used to support Canada goose research and to buy equipment used to manage wetlands.

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Cache Customer

This red squirrel's hide-away houses a cache of pine cones that it will feed on during the winter months. For more about North Carolina's tree squirrels, see story on page 48.

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Special Issue

THE SMOKIES
a new era

Hopperlope Hunting

by Jim Dean ©2001

ILLUSTRATED BY JACKIE PITTMAN ©2001

"...I doubt that kids who learn safe gun handling early in life ever grow up to become threats to society."

Gus brought his air rifle on one of our trout fishing trips last Opening Day. Gus is the 11-year-old son of my longtime fishing buddy Andy Aretakis. Late one afternoon after we had finished fishing, we pulled off our waders and gathered with the others on the porch of Alvin Johnson's cabin nestled in this Southern Appalachian valley alongside a trout stream.

I first came here more than 30 years ago with Alvin's father, A.J. Some of the older members of the group are gone—A.J. died in 1993—but the rest of us still come up several times a year, and there are now some younger fishermen like Gus among us. It's an easygoing group of dear friends, and we share a love of fishing, bluegrass music and the hazy, heavily forested mountains, dark hollows and bright, tumbling streams that are the natural habitat of our mutual interests.

We watched Gus as he set tin cans on stumps in front of the cabin. I noted with satisfaction that he was very mindful of where his air rifle was pointed. As he sent the tin cans spinning, we stopped talking. Finally, I could stand it no longer. "Lemme see that thing," I said. "I used to have a Daisy Red Ryder carbine when I was about 10 years old. I wish I still had it." Several of us swapped turns shooting cans long enough to satisfy our suspicion that shooting skills don't accumulate with age.

A kid with a BB gun was once a familiar cliché, but this nation's current panic over anything that shoots has taken care of that lately. I think it's a huge loss. An air rifle—followed a few years later by a .22 or a shotgun—still has an unmatched capability to teach any youngster that responsibility and respect for wildlife go hand in hand with the pleasures of target shooting and hunting, especially if a safety-minded parent or grandparent has been the instructor. There probably aren't any statistics to support it, but I doubt that kids who learn safe gun handling early in life ever grow up to become threats to society.

Contrary to popular sentiment, air rifles and pellet guns—even relatively inexpensive ones—have never been strictly kids' stuff. In 1963, when I was a green second lieutenant stationed in Baltimore, I had the good fortune to meet some local sportsmen. One was a fellow named Lefty who lived in Frederick and worked as a night watchman at Fort Detrick, but his long-term goal was to become an outdoor writer. He was already writing articles and giving fly-casting demonstrations. Lefty Kreh—yep, that Lefty—has since become a well-known book author, newspaper outdoor editor and perhaps the most famous fly fisherman in the world.

"Let me show you something," he said one afternoon after we had unloaded our fishing gear. He grabbed an air rifle and a box of aspirin tablets from his basement and took me out in his backyard. "I'm working on an article about how to improve wingshooting," he explained.

Then he tossed an aspirin tablet into the air and shot it with a BB. It exploded in a tiny white puff. I was astonished. "Here, I'll do it again." Another puff. Then he demonstrated that if you waited until the tablet was near motionless at the peak of its flight, it was possible to hit it regularly. You could even see the path of the BB against the sky and make adjustments. It took a little practice, but I finally managed to powder a tablet.

I decided not to tell this story to Gus and the others, because I was fearful someone might produce a box of aspirin tablets. Instead, I asked if any of the older members of our group remembered Ted Trueblood, the highly respected, longtime columnist for *Field & Stream*. "Once every two or three years he would write a column explaining how you could sharpen your shotgun skills by hunting grasshoppers with a smoothbore, single-shot .22 and ratshot," I said. "I think it was his favorite subject. He'd walk through a field, and the big hoppers would fly up ahead of him just like bobwhites. I never tried it, but I can imagine that it was great practice."

"Okay, so did he get his picture taken with his foot on the neck of a trophy grasshopper?" ventured Dick Hawes. Tom Cooper took up the theme. "If this catches on, you know what you're going to find in every sportsman's cabin, don't you?"

No, we didn't.

"Hopperlopes," said Tom triumphantly. "Grasshoppers with tiny fake antlers. They'll be mounted on little plaques and sold as gags. You know, like jackalopes."

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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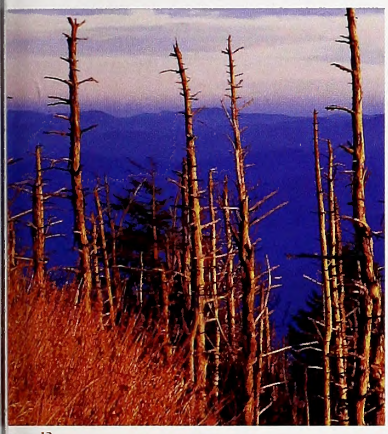

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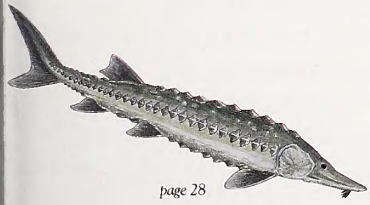

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Sleeping through March

written by Roger A. Powell ©2001
illustrated by David Williams

Black bears in our mountains spend March in their winter dens, mostly snoozing and waiting for spring, when food will become available again. Skunks, too, head into dens when autumn foods begin to dwindle. Their dens are not always cozy. They are normally small caves, hollow logs and hollow trees, and even the most picturesque have doors that stand open to the elements all winter. Why would black bears and skunks spend their winters in places like these? Well, considering the alternatives, it's not a bad option. Settling down for a long sleep, even in a chilly bedroom, beats spending the winter fruitlessly looking for food.

Although black bears and skunks are omnivores and eat both plant and animal material, what they eat is limited in scope, and most of it disappears during winter. These critters are not active predators and kill little vertebrate prey. Skunks do kill some mice, but mostly mice whose nests they find, and prey on lizards, snakes, toads, frogs and turtle eggs. Reptiles, amphibians and many small mammals disappear to hibernate during winter. Both bears and skunks scavenge carrion, but it is undependable.

Instead, bears and skunks eat a lot of insects and other invertebrates. Walking through the mountain forests in summer, you may find holes in the ground where yellow jackets' nests used to be. Bears excavate them to reach the larvae and pupae. Bears push over large rocks to expose ants' nests and to get larvae and pupae. They tear apart rotten logs to expose the larvae of wood-boring beetles. Indeed, insects provide much of a bear's protein requirements each year, but they disappear during winter. Skunks also eat crayfish, worms and snails. All these invertebrates disappear during winter.

The dominant foods in bears' diets, however, and important foods for skunks, are plant parts. Like other predators, bears and skunks have short digestive tracts with no adaptations for digesting cellulose, a major constituent of plants' cell walls. Consequently, bears and skunks are very choosy about what parts of plants they eat. They eat few leaves but enjoy easy-to-digest fruits and seeds. Blueberries, blackberries, cherries, grapes, huckleberries, serviceberries and anything else with "berry" in its name are food for bears and skunks. Acorns, hickory nuts and hazelnuts are important fall foods. But, just like their animal foods, bears' and skunks' plant foods disappear or become scarce during winter.

Thus, sleeping through most of the winter, even in a drafty den, is a good option, but a good option only for an animal with enough fat to nourish it through the winter. Bears and skunks, therefore, must prepare themselves for winter by putting on fat through the summer and fall. Berries and insects, nuts and grapes are usually abundant enough to support the massive appetites of skunks and bears, which chow down and bloat up. By the time they enter their winter dens, bears and skunks may have doubled their weights. Then, during the long winter, they use the fat to fuel their bodies and survive until spring.

Could we play bear or skunk, curl up in a cozy chair after a massive dinner and read till our bodies burn the extra fat? Nope. We are not bears or skunks. Bears, we have learned, have special adaptations to survive a long fast. First, bears drop their metabolic rates somewhat and lower their body temperatures about 5 degrees Celsius to reduce energy requirements during their fast. Second, bears do not simply fast but survive six months without eating, drinking, urinating or defecating. They maintain their water and protein balances, in part, by not making urine. Instead, their kidneys turn waste nitrogen into urea, as normal, but then recycle it into blood proteins that are returned to the blood supply. Without a buildup of urea, bears do not need to dilute it with water to make urine. Third, bears do not lose bone mass while lying still for many months. Instead, their bones maintain building processes that our bones slow when we become inactive.

How bears evolved these adaptations we do not know. Nor do we know if skunks use all the same tricks, although, since skunks face the same challenges as bears during winter, they should have similar adaptations. We humans, however, must find other ways to deal with overindulgence.

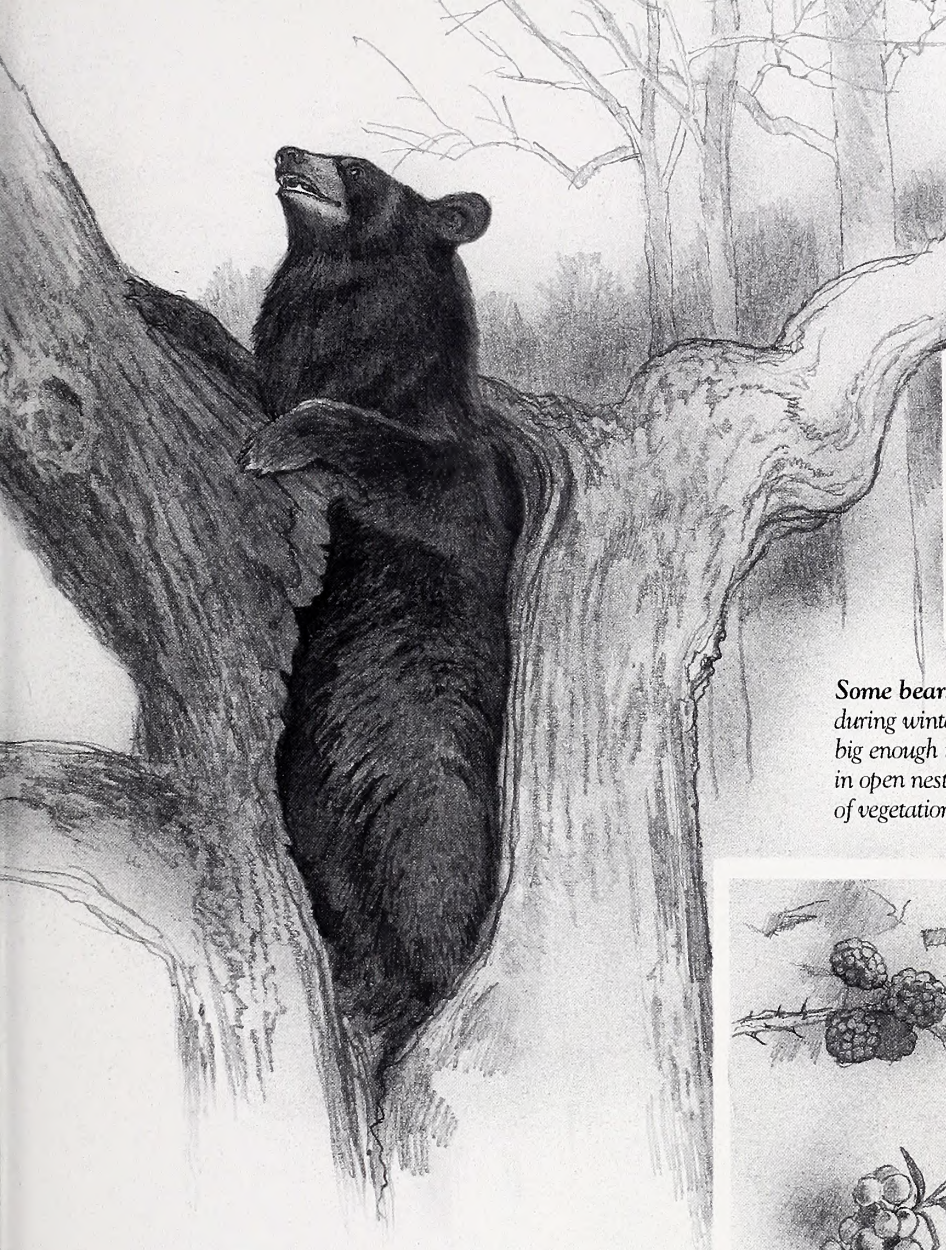
Roger A. Powell is a zoology professor at North Carolina State University.

Other Reading:

- Wilson, D. E. & S Ruff (eds). *The Smithsonian Book of North American Mammals.* Smithsonian Institution Press. Washington.

Surfing the Web

- For more information on bears, Address: *http://www.bear.org/index.html*
- For more natural history information on skunks, Address: *http://www.geocities.com/Yosemite/Trails/5335/Animals/stripedskunk.html*



***Some bears den** in hollow trees and snags during winter. Others den in small caves just big enough to hold a bear. And still others den in open nests on the ground or in dense stands of vegetation.*

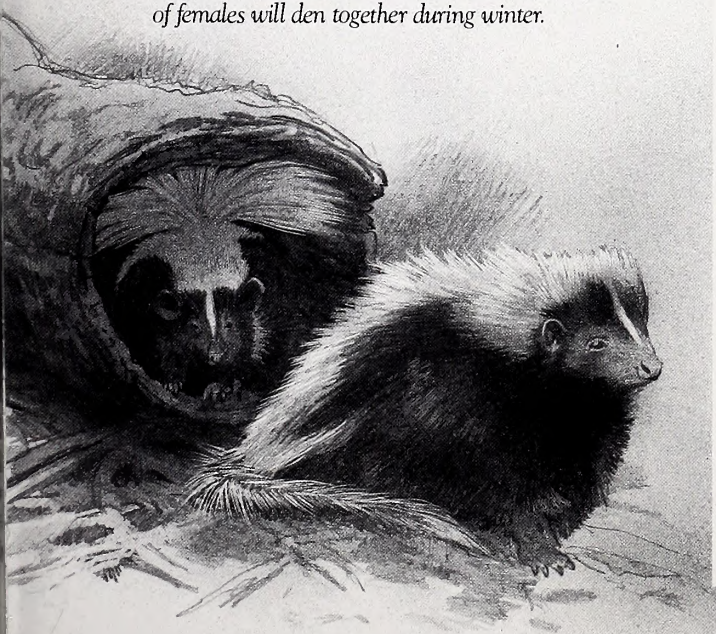
***Skunks and bears** have similar diets, including berries, other vegetation, insects and carrion. All of these foods become scarce in winter, forcing bears and skunks to fast for several months.*

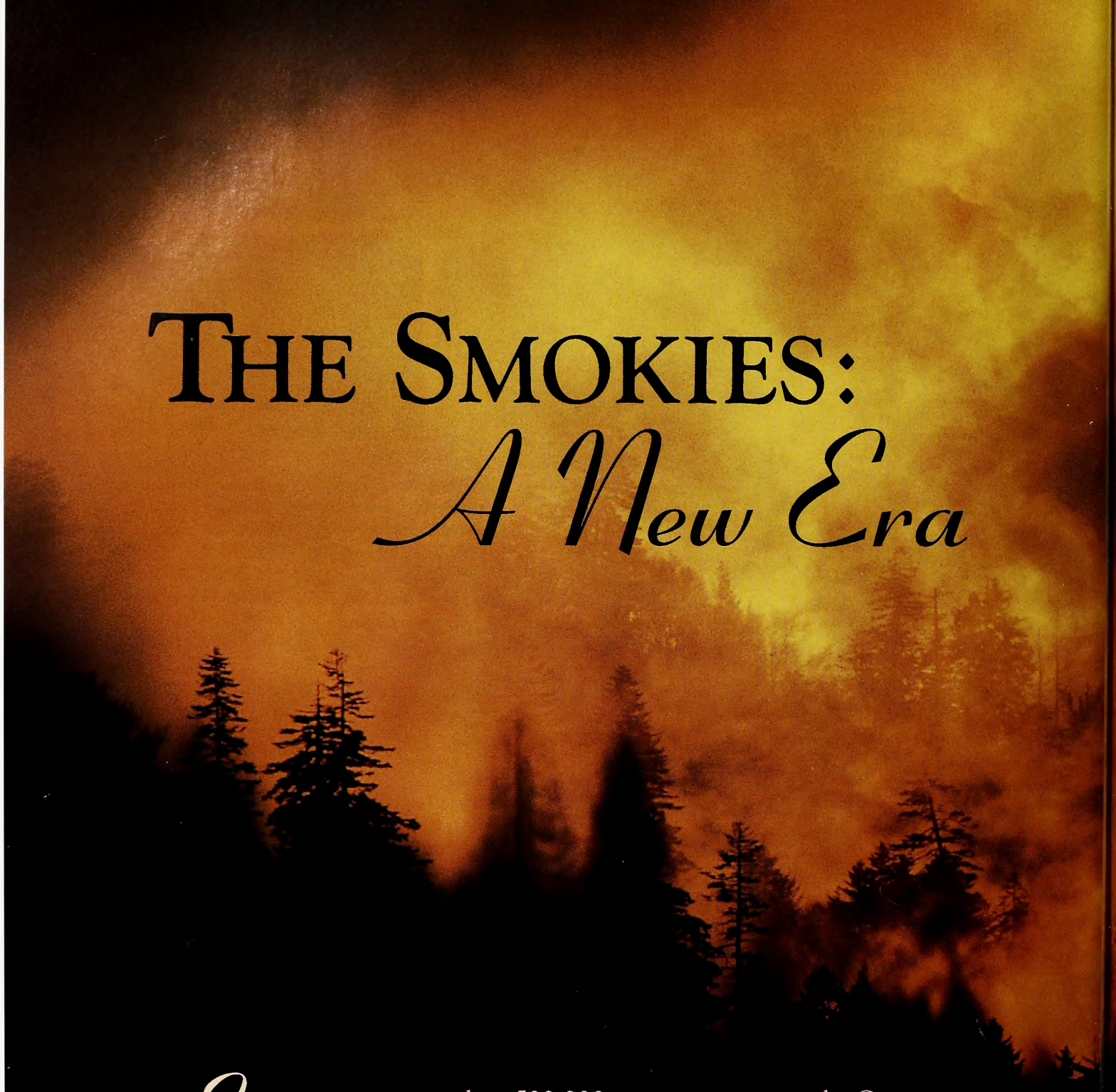
***Berries and other fruits** make up a large part of the diets of skunks and bears during summer. These foods are high in carbohydrates but low in protein, causing the animals to seek other foods high in protein.*

***Acorns have more protein** and fat than most plant foods and help skunks and bears put on enough fat in fall to support their long fasts.*

***All summer, skunks and bears** eat insects to obtain protein. They raid the nests of ants, bees and yellow jackets. The larvae and pupae are the most important targets of the nest raids, but honey is a bonus.*

***Skunks den in holes** in the ground during winter. When possible, skunks adopt holes dug by woodchucks or other animals. Often, groups of females will den together during winter.*





THE SMOKIES: *A New Era*

Encompassing more than 500,000 acres in two states, the Great Smoky Mountains National Park embodies the heart and soul of the Southern Appalachians. Formed in 1934, the park harbors a dazzling diversity of life and scenic beauty. But the park is not without its share of troubles: air pollution, non-native species and 9 million visitors per year all take their toll. Here is a look at some of the efforts underway to protect and restore this wonderful place.

A Chance At History

written by Chris Powell
photographed by Ken Wilson © 2001

It's been more than a century since elk inhabited North Carolina. But an experimental reintroduction underway could mean a future home in the Great Smoky Mountains National Park for these large animals.

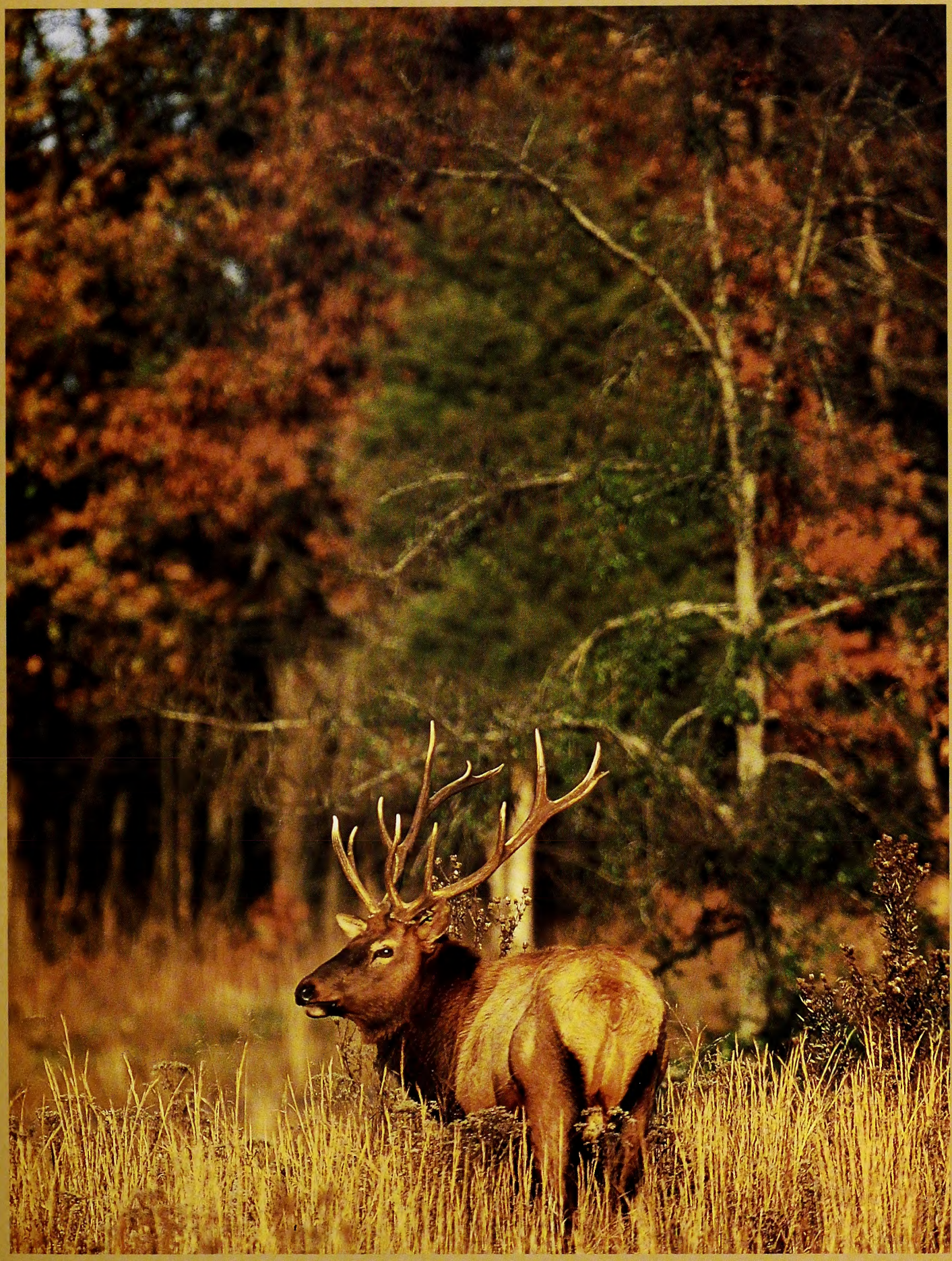
Beginning as a loud baritone note, then quickly proceeding to a sustained high-pitched squeal, the "come hither" of a bull elk during mating season can make the hairs on the back of your neck stand up. Only a large animal can produce such a sound. It's a primordial vocalization that echoes back some 120,000 years to a time when elk first inhabited much of our continent, including this state. And for the first time in more than two centuries, those love sonnets will again reverberate through a portion of North Carolina's mountains.

In an attempt to reestablish elk populations in the Great Smoky Mountains National Park, biologists with the National Park Service brought 25 elk to Cataloochee Valley in the park in early February. An additional 25 elk will be released each year for the following two years.

Kim Delozier, a supervisory wildlife biologist with the Park Service, said the elk release isn't so much a reintroduction as it is a five-year research project to determine if the species can sustain itself. If considered a success, the elk will be allowed to remain, providing a missing piece of the park's ecological puzzle.

"It is basically our mandate to restore species to the park that have been lost, particularly those species that have been lost due to man's actions such as overharvest or land use that results in loss of habitat," said Delozier, who has been involved with the project since the early 1990s. "We cannot bring every species back. However, it is our job to ask: Which ones can live here again?"

The subspecies being released in the Smoky Mountains is the Manitoban elk. It is considered a close relative of the now-extinct Eastern elk, which was extirpated from North Carolina during the late 1700s because of overharvest and loss of habitat from logging. The Manitoban elk shares many



traits with the Rocky Mountain elk, the most populous of the subspecies. It is a grazer and a browser, with males weighing as much as 1,000 pounds and growing very large antlers.

The elk herd released in the Smokies originated from Elk Island National Park, located in Alberta, Canada. In 1996 the Tennessee Valley Authority acquired 29 of the animals and moved them to Land Between the Lakes, a national recreation area in western Kentucky. From there they were transported to North Carolina. The National Park Service chose this particular herd because of its long-term history of disease monitoring and relatively good herd health status. "The Elk Island National Park herd is certified brucellosis and tuberculosis free since 1972, and monitoring efforts have taken place for chronic wasting disease," Delozier said.

Upon arrival in the Smokies park, the elk will be placed in a holding pen for approximately two months to help acclimate them to their new surroundings. Researchers hope that the end of that period will coincide with the arrival of new vegetation in the spring. "We don't know yet how these elk will react," Delozier said. "These animals will be in an unfamiliar environment, and it will take a while for them to get settled in. Elk managers in other states think the bulls will stay in the higher elevations until the fall breeding season," he said. "Hopefully the elk will provide the answers to the many questions surrounding this project."

How Will They Behave?

Because there are so many unknowns, researchers with the U.S. Geological Survey's Southern Appalachian Field Laboratory will conduct an extensive monitoring effort on the elk. Joe Clark, a research ecologist with the U.S. Geological Survey, and graduate assistant Jennifer Murrow will be the ones collecting and evaluating data, and going out into the field to perform the occasional checkup. "We will be looking at this in the terms of: Is this going to work?" Clark said. "Are the mortality rates going to be low enough? Are the reproduction rates going to be high enough? The other thing we want to look at is whether this reintroduction will work in terms of the park. We will be releasing a big herbivore into an environment that hasn't seen elk for centuries. We want to make sure the elk aren't going to cause any irreversible damage."

Since hunting is not allowed within the park, causes of elk mortality will be studied closely. Predators encountered by elk in North Carolina will likely include bears, bobcats and coyotes, which can eat the calves and the occasional sick adult. There is also the potential for mortalities caused by automobiles, and no one is sure what effect brain worms—a parasite known to attack elk—might have. Each animal will be fitted with a tracking collar and a mortality sensor, indicating immediately if an elk dies. Once notified, researchers will be able to locate the animal and determine a cause of death.

Great Smoky Mountains National Park

In an attempt to reestablish elk populations in the Great Smoky Mountains National Park, biologists will release 25 elk near Cataloochee Valley in the park. An additional 25 elk will be released each year for the following two years. Where the elk roam after that is anybody's guess.

Some collars will contain a Global Positioning System device that will keep detailed logs of the animals' travel patterns. "That will give us an idea of what habitats are being used and in what proportion, and what habitat types they need and don't need," Clark said. Finally, vaginal implants will be placed inside the adult female elk. When a calf is born, the implant will be pushed out, and the change of temperature will set off the transmitter, notifying researchers who can then locate the calf and attach a collar.

Because the park is not fenced, elk will have the ability to roam significant distances. To address this, two imaginary zones have been established surrounding the park: the buffer area and the no-elk zone. If an elk wanders into the buffer area and is not causing significant problems, it will be allowed to remain in hopes that it will return to the park. If the elk becomes a problem within the buffer area, it will be located, captured and returned to the park. All elk that enter the no-elk zone will be immediately removed.

To protect elk from poaching, the N.C. Wildlife Resources Commission is considering giving the already nongame animal a Special Concern status that would elevate the fine from $50 to $100 if an elk is killed and up to $500 for a repeat offense. "This is simply an effort to provide a heightened level of protection for these animals if they happen to travel out of the National Park Service's jurisdiction," said David Cobb, the Wildlife Commission's wildlife management chief.

A Supportive Public

Support for the elk release has been very strong, with a number of nonprofit groups working to provide funding. Much of this effort has been shouldered by the Rocky Mountain Elk Foundation, which has raised $200,000 to help fund the project. The organization has also been involved with a release of 50 elk on the Cumberland Plateau in Tennessee, located between Knoxville and Nashville. This is the first time elk will have populated this area since the mid-1850s. Plans are also in the works to release elk in the Virginia mountains.

"I have been here since 1978, and this project has received more support from the public than any other project in that time," said Delozier, referring to the North Carolina release. "We had more than 2,400 people respond to the environmental assessment of the elk project, and we had only three comments that clearly opposed the project and seven neutral comments. The rest supported the project." (The three comments concerned possible diseases, elk damage and nuisance problems.)

***Researchers** prepare an elk for transportation, following its capture. Bull elk (below) compete for the affections of a nearby cow elk by clashing antlers to demonstrate dominance.*

Elk History

Descendants of the Asian red deer, elk are believed to have traveled to North America some 120,000 years ago when ocean levels receded during the Ice Age, revealing the Bering land bridge. The red deer crossed from what is now the eastern portion of Russia into Alaska, gradually filtering into present-day Canada and the United States. The historic range of the Eastern elk extended as far south as Georgia and Mississippi and included the North Carolina mountains and western portions of the Piedmont. In addition to the Rocky Mountain and Manitoba subspecies, there are two additional subspecies populating North America. The Roosevelt elk is typically found in the coastal forests of Oregon, Washington and British Columbia. The Tule elk is exclusively a California subspecies.

Reduced to a population of 35,000 around the turn of the century, elk have benefited from

With the experimental release this year, the ghostly bugles of wild elk will once again echo in our mountains. A biologist prepares a temporary enclosure (below) to hold elk until they are relocated into the Cataloochee Valley in the Great Smoky Mountains National Park.

WILLIAM S. LEA

reintroductions and careful management which have brought populations back to more than three-quarters of a million animals. Even so, it is much too early to determine to what extent or even if elk populations might succeed in the Great Smoky Mountains National Park.

During the early 1990s, the U.S. Fish and Wildlife Service tried unsuccessfully to reestablish red wolves in portions of the park. A total of 30 wolves were released over an eight-year period before the project was canceled and the surviving wolves removed. Bob Miller, the park's spokesman, said the decision was based on the red wolves inability to reproduce and their unwillingness to remain in mountainous, forested habitat. However, red wolves were successfully reestablished in the late 1980s within the Alligator River National Wildlife Refuge, located in northeastern North Carolina. The terrain, along with a plentiful food supply, has proven much more to the wolves' liking, and as many as 90 now inhabit the refuge.

Reasons for Optimism

Biologists have many reasons to believe the elk project will not share the fate of the red wolf attempt in the Smoky Mountains. They know that elk once inhabited their targeted release area, that food will be adequate and climate conditions tolerable. Confidence is also gained from the knowledge that elk introductions have proven successful in other states, including Kentucky, Pennsylvania, Oklahoma and Michigan.

That said, it is much too early to predict to what extent elk populations could grow in the Southern Appalachians, if the study proves successful. They will never reach the astronomic levels that white-tailed deer have. But could they increase to the point that they don't need constant monitoring? Will a hunting season ever be needed to keep the populations in check? Only time will tell. But for now, any lover of wildlife can take comfort in the fact that a large, wild animal is back in its rightful place. And that the orchestra of nature in the Great Smoky Mountains National Park will once again include the ghostly sound of elk bugles. ⊠

SAVING THE Specks

JIM DEAN

written by Rodney Foushee

Park biologists plan to unleash a new weapon this year in the battle to preserve the speckled trout.

Steve Moore can't forget 1978. That's the year that the National Park Service fully banned fishing for brook trout in the Great Smoky Mountains National Park and put some 175 miles of stream off limits to fishing altogether.

After decades of stocking nonnative rainbow trout in the park's waters, biologists in the 1970s realized that most of the native brook trout had been displaced by these invaders and were forced to the refuge of high-elevation, headwater streams. Predictions were dire.

"We projected back then that if things didn't change, we would we be out of brook trout by the year 2000," said Moore, who was a young fisheries biologist at the park when the fishing ban was first put in place to protect the tiny trout. This watershed moment has driven and haunted Moore over the past 23 years, with much of his career spent in a series of battles to restore the park's only native trout species. It's a war Moore doesn't plan to lose.

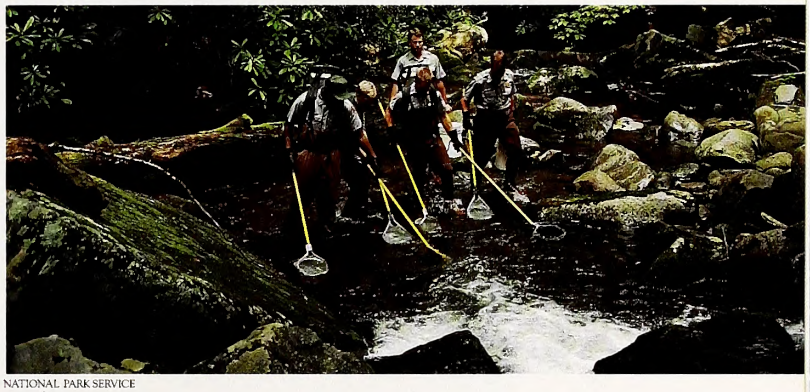
The story of the Southern Appalachian brook trout is one of gains and losses—misfortune and hope. An Ice Age holdover, the brook trout is actually a char. Nevertheless, it is the only native trout to have lived in the East—both rainbow and brown trout were brought here from afar and stocked around the turn of the last century.

To complicate matters, old timers have long claimed there was a difference between the native "speckled" trout of the Southern Appalachians and stocked, northern brook trout, both in size and coloration. Recent DNA studies are proving what the locals have claimed for years—a genetic difference exists between native trout and their larger northern cousins. As if competition from other trout species along with genetic pollution from hatchery-reared northern brookies wasn't enough, recent acid deposition in the higher elevations of the park caused by air pollution (See "Purple Haze," p. 12) has squeezed and isolated native fish in vulnerable stream pockets.

Enter Moore, and his army of volunteers. For two decades they have trudged up the park's remote streams carrying backpack-mounted generators to produce electricity to shock and remove rainbow trout. This labor-intensive ground assault has met with limited success—six streams and 8 miles of water in the park restored for the specks.

This fall, park biologists plan to unleash a new weapon in the war to restore brook trout in the Smokies. Originally developed as an antibiotic for livestock, antimycin has proved to be an effective fish killer. The antibiotic, which eliminates fish and other aquatic life and then quickly breaks down into harmless natural elements, has been used successfully to restore cutthroat and bull trout populations in western parks including Yellowstone and Rocky Mountain national parks. And there is no reason to doubt antimycin won't work as well in the Smokies. "If I didn't believe in this, I would not be attempting this work," Moore said.

Moore has been given the green light for an experimental release of antimycin beginning this September in a 2.5-mile stretch of Sam's Creek in the Tennessee portion of the park. Native brook trout will be removed from the creek first and put in a refuge area while the stream is treated. Results from out West suggest that the stream will fully recolonize with aquatic life within three years.


NATIONAL PARK SERVICE

***Park biologists** use backpack-mounted generators to remove non-native rainbow trout.*

If the Sam's Creek project goes well, Moore has identified 11 more streams and 35 to 40 miles of water that he believes can be treated with a combination of antimycin and electricity. Some of the bigger streams in North Carolina include Bear Creek and Desolation Creek.

When will Moore be satisfied that victory can be declared in the war to save the speckled trout in the Great Smoky Mountains National Park? That's simple: "I'll be satisfied when we get these 11 streams restored and we can allow the public to fish for brook trout in this park once again," he said. "That's the goal." ⊠

THE SMOKIES
a new era

PURPLE *Haze*

written by John Manuel © 2001

Famed for their natural bluish mists, the Smokies are now being colored by man-made chemicals that are plaguing the mountains with some of the worst air pollution in the country.

WILLIAM S. LEA

Heading east on Interstate 40 from Knoxville, Tenn., I scan the horizon for the blue green wall of the Great Smoky Mountains. The first sight of those mountains always sends a chill up my spine. My soul flies to the high peaks, where I imagine roaming among the evergreens with the ravens and the bears. But something is wrong. I'm 15 miles from the park and there is still no sign of the Smokies. Gradually, painfully they come into view—a pale blue stain on the horizon. My spirits sink, my eyes fall to the highway. Like a favorite color photograph gone bad with age, the Smoky Mountains have been robbed of their grandeur. The pollution problem is bad and, I'm told, getting worse. If we don't take bold steps to reverse the situation, there is no telling how the park will suffer.

Air pollution has long been a problem in our urban areas, but in recent decades it has spread to the very places we go to escape the problems of the city, our national parks. Ranked by a combination of pollutant-related measures for visibility, ozone and acid precipitation, the Great Smoky Mountains is the most polluted national park in the country. Air pollution isn't just a matter of aesthetics, it is threatening the survival of flora and fauna. Some scientists believe air pollution is to blame for virtually all the premature tree deaths in the Southern Appalachians.

"There is no way that air pollution is not the major factor in the destruction of the native ecosystem of the Smokies," says Harvard Ayers, professor of anthropology and sustainable development at Appalachian State University.

JOHN MANUEL

Other scientists ascribe a more limited role to air pollution, pointing out that disease, drought and insect predation play at least as big a part. But virtually all of those who have studied the issue agree that air pollution is a serious and growing problem in the Smokies and that steps must be taken to reverse it.

Ironically, the very factors that make the Smokies the most popular national park in America contribute to its pollution problems. The park lies within a day's drive of many large urban areas, making it accessible to some 9 million visitors a year, but also exposing it to high levels of air pollution from automobiles and coal-burning industries and power plants. North Carolina is responsible for some of this pollution, but scientists say most is brought in from the Tennessee, Ohio, and Mississippi river valleys by prevailing westerly winds. The height and physical structure of the mountains, which attract so many sightseers, also tend to trap and concentrate airborne pollutants. The mist and rainfall that contribute to vibrant tree growth bind with these pollutants and transport them into the soil and water.

Various Pollutants

The pollutants that plague the Smokies take a number of different forms, each of which acts on the ecosystem in a particular fashion. Scientists say it is important to understand how each of these functions in order to take justifiable and meaningful steps toward reducing the negative impacts. For example, the haze that I saw upon approaching the park is due partly to natural factors and partly to man-made ones. The Smoky Mountains derive their name from the bluish mists that rise up from the forest after a rain. This mist is formed by chemical compounds released from trees that bind to drops of moisture and scatter the light. However, the haze has been made much worse by air pollutants, sulfates in particular, which obscure the view even on dry summer days. Visibility in the park used to average around 93 miles year-round and 70 miles in the summer. That has now declined to an annual average of 25 miles and a summertime average of 15 miles. With the enforcement of provisions of the Clean Air Act, sulfur dioxide (SO_2) emissions, which contribute to the formation of sulfates, have been declining nationwide over the past few years. However, summer sulfate concentrations remain high in the park, and visibility has not improved.

Another pollutant plaguing the park is ozone. Ozone (O_3) is an invisible gas and therefore unrelated to the visibility problems in the mountains. It can be both a protector and destroyer of life, depending upon where in the atmosphere it forms and in what concentrations. High in the atmosphere, intense sunlight breaks up oxygen molecules and causes them to reform as ozone. This stratospheric ozone is beneficial in that it provides a shield against the harmful effects of the sun's ultraviolet rays.

Ozone also occurs in the lower atmosphere, when volatile organic compounds (VOCs) and nitrogen oxides (NOx) released by both natural and man-made sources combine in the presence of sunlight. Both plants and animals can tolerate natural concentrations of ozone, but the additional loading from man-made sources is causing ozone levels to rise to the point where they damage living tissue —plant cells and human lung tissue among them.

WILLIAMS LEA

***The effects** of air pollution, combined with an exotic insect, have taken a toll on these Fraser firs located at Clingman's Dome. Even low-growing plants aren't spared from the damages caused by acid precipitation and ozone (above).*

The Environmental Protection Agency (EPA) sets standards for exposure to ozone as it relates to human health. Since May 1998, the Great Smoky Mountains National Park has exceeded the National Ambient Air Quality Standard on 121 different days. On average, daily ozone levels over the ridgetops of the Smokies are twice as high as those in the cities of Knoxville and Atlanta!

The Fallout

The impact of high ozone on the park is being felt in a number of ways. On ozone-alert days, tourists are warned to avoid strenuous activities, such as hiking the park's trails. Jim Renfro, air resource specialist at Great Smoky Mountains National Park, says he does not know of any instances of hikers being hospitalized due to ozone exposure, but he warns that it is entirely possible for someone to suffer lung damage if they persist in hiking during these times.

Plants, on the other hand, are clearly showing signs of ozone damage. In the parking lot for the trail to Clingman's Dome, I meet Howard Neufeld, professor of biology at Appalachian State University. Neufeld and his students, working under the direction of Renfro, have identified more than 90 plant species that appear to have been damaged by ozone. Damage is especially evident in higher elevations, where ozone levels can remain high both day and night (at lower elevations, ozone typically spikes during the day, and falls at night). As we hike the trail to Clingman's Dome, Neufeld stops and points to a patch of coneflowers. Many of these head-high plants appear healthy, with green leaves and bright yellow flowers. But others have badly discolored leaves, as if struck by an early frost. This, Neufeld explains, is the work of ozone.

"Plants absorb the ozone through the stomata on the underside of the leaves, and that interferes with cell biology," Neufeld says. "The most common sign of stress is a purpling or bronzing on the top side of the leaf. The worst-exposed leaves will yellow and die. We don't have any evidence that ozone in the concentrations we've experienced will actually kill a tree, but it can retard growth."

***Evidence** gathered by researchers indicates that ozone can destroy plant tissues and retard the growth of trees.*

JOHN MANUEL

***Howard** Neufeld, a professor of biology at Appalachian State University, inspects plants damaged by ozone.*

The premature aging of coneflowers is disturbing enough, but my eyes are drawn to a much more dramatic scene. All around us, the gray skeletons of Fraser fir trees line the flanks of Clingman's Dome. Visitors stop and shake their heads in dismay, wondering what might be the cause. Neufeld says this is the work of an insect, the balsam wooly adelgid, introduced from Europe around the turn of the century and discovered in the Southern Appalachians in the 1950s. The adelgid kills Fraser firs by injecting a mouth part called a stylet through the bark and sucking out the juices. The tree essentially overreacts to the bite, forming an impervious layer of wood that clogs the xylem, a layer below the bark used by the tree to consume nutrients and water. Deprived of these essential elements, the tree literally chokes itself to death.

Neufeld believes the adelgid needs no other agent to kill off Fraser firs. But others, including Samuel McLaughlin, senior scientist at Oak Ridge National Laboratories, think the manmade pollutant known as acid rain contributes to the problem.

"I think it's highly probable that a depletion of calcium due to acid rain has made the trees more susceptible to disease," McLaughlin says. "We have measured depleted calcium levels and higher plant respiration rates in the high elevations of the Smokies. Trees are expending more energy to do the work of growth."

What causes acid rain, and exactly how might it contribute to the premature death of trees? Natural, unpolluted rainfall has a pH ranging

WILLIAM S. LEA

from 5.0 to 5.6. Rainfall in the Smokies has an average pH of 4.5—nearly 10 times more acidic than normal rain, and the mists that linger in the high elevations are as low as pH 2.0. This unusually high acidity has been traced to sulfur and nitrogen compounds from car and truck exhausts and from coal-burning industries and power plants. Acid rain doesn't directly damage trees, but over a long period of time, it can change the soil chemistry in ways that can be harmful.

The high acidity of rainwater is definitely impacting native brook trout populations in the high elevations of the Smokies. Steve Moore, supervisory fisheries biologist with the Great Smoky Mountains National Park, says both Cannon Creek and the headwaters of LeConte Creek once supported brook trout but have now become too acidic to do so. He has seen a 50 percent drop in the trout population in the headwaters of Silver Creek.

"Our streams are naturally on the acidic side, and any additional input pushes things over the edge," Moore says. "At pH levels below 5.8 or 5.9, you start to see impacts on the number of brook trout eggs. Below 5.5, you lose all reproduction. Below 5, all the brook trout are gone." (See "Saving the Specks," p. 11, for more on brook trout.)

What is Being Done?

Within the park itself, specific actions have been limited to raising public awareness via displays at various sites, and ongoing monitoring of air quality. Chemical countermeasures such as liming of streams and soil to raise pH levels have been deemed overly expensive and run counter to the hands-off management approach in the park. Actions such as banning automobiles in parts of the park, though frequently discussed, are not currently planned.

Under the Clean Air Act, the National Park Service is invited to comment on state air quality permit applications for new power plants and industries whose emissions may affect the park. According to Park Service officials, most of these applications have been granted without fulfilling the Park Service's recommendations. Thus, it appears that real change depends upon the formulation and enforcement of tighter air quality standards at the state and federal levels.

In 1997 the EPA proposed tightening standards for ozone and particulate matter. Various industries sued the EPA, claiming the standard was too strict, and the case has been remanded to the Supreme Court. If the standard is upheld, counties not meeting it will likely be required by state and local regulatory agencies to take actions to reduce emissions from stationary and mobile sources. The EPA has also approved a new nitrogen oxide standard that would require 22 eastern states to reduce their NOx emissions by 30 percent by 2003. That rule was also challenged but has been upheld in court.

Theoretically, compliance with these standards should lead to improvements in visibility, ozone and acid precipitation by the middle of this decade. However, restoring a balance to Appalachian streams and soils may prove to be more complex than originally anticipated. Recent research suggests that atmospheric dust is an important source of base cations for naturally acidic soils such as those in the Smokies. Base cations occur in the atmosphere along with acidic ones, binding themselves to dust particles which are then transported by rain into the soils. By reducing particulate emissions from man-made sources, we may actually be depriving Appalachian soils of a vital source of base cations. Thus, it may be premature to predict an improvement in forest health resulting from enforcement of present Clean Air standards.

"It is entirely feasible that continuing acid rain, in combination with limited supplies of base cations, could produce environmental conditions to which many plant species have never been exposed," researchers Lars Hedlin and Gene Likens write in a recent issue of *Scientific American*. "Consequently, predicting how they will respond over the next several decades may be extremely difficult."

I leave the Smokies in the troubled state of mind with which I arrived. The complexity of the science, like the haze that hangs over the mountains, seems to obscure the path to recovery. And when science is less than definitive, powerful interests resist the call to action. So it is up to the continued efforts of scientists like Neufeld and McLaughlin to establish clearly the connections between air pollution and ecosystem damage. As they do, it is up to us, the citizens, and our elected representatives to demand that the necessary laws are passed, and the changes in lifestyle and business practices implemented, to allow the Smokies to survive. ⊠

KEN TAYLOR

***North Carolina** is responsible for some of the air pollution affecting the Smokies, but the majority has been linked to industries located in the Tennessee, Ohio and Mississippi river valleys.*

Jewel of the Smokies

white trillium along a stream

Despite its challenges, the Great Smoky Mountains National Park endures as one of the great wild places of eastern America.

photographed by
William S. Lea © 2001

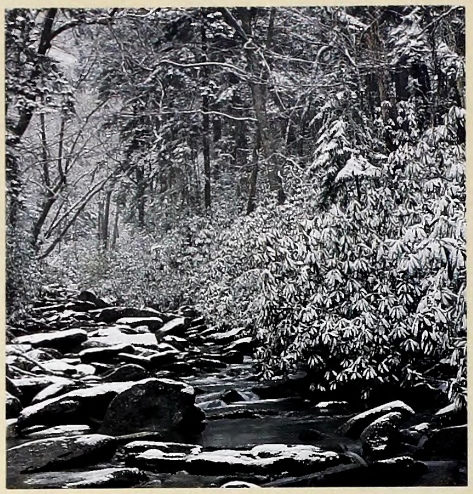
morning fog in a valley

diversity of plant life

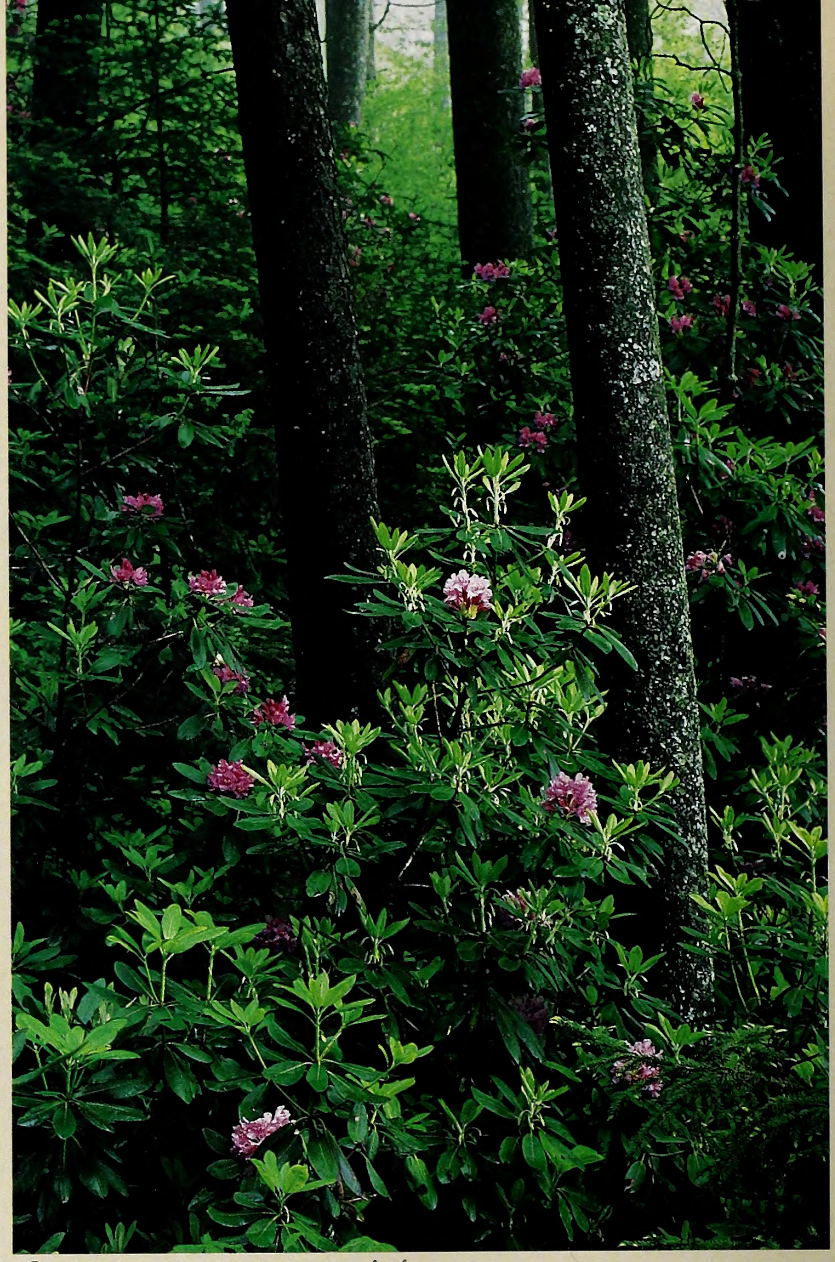
Life—in a glorious diversity of forms—cloaks the Smokies park like a rich tapestry. Each species—large and small—adds to the brilliance and depth of this vivid place.

young black bear

trout stream in winter

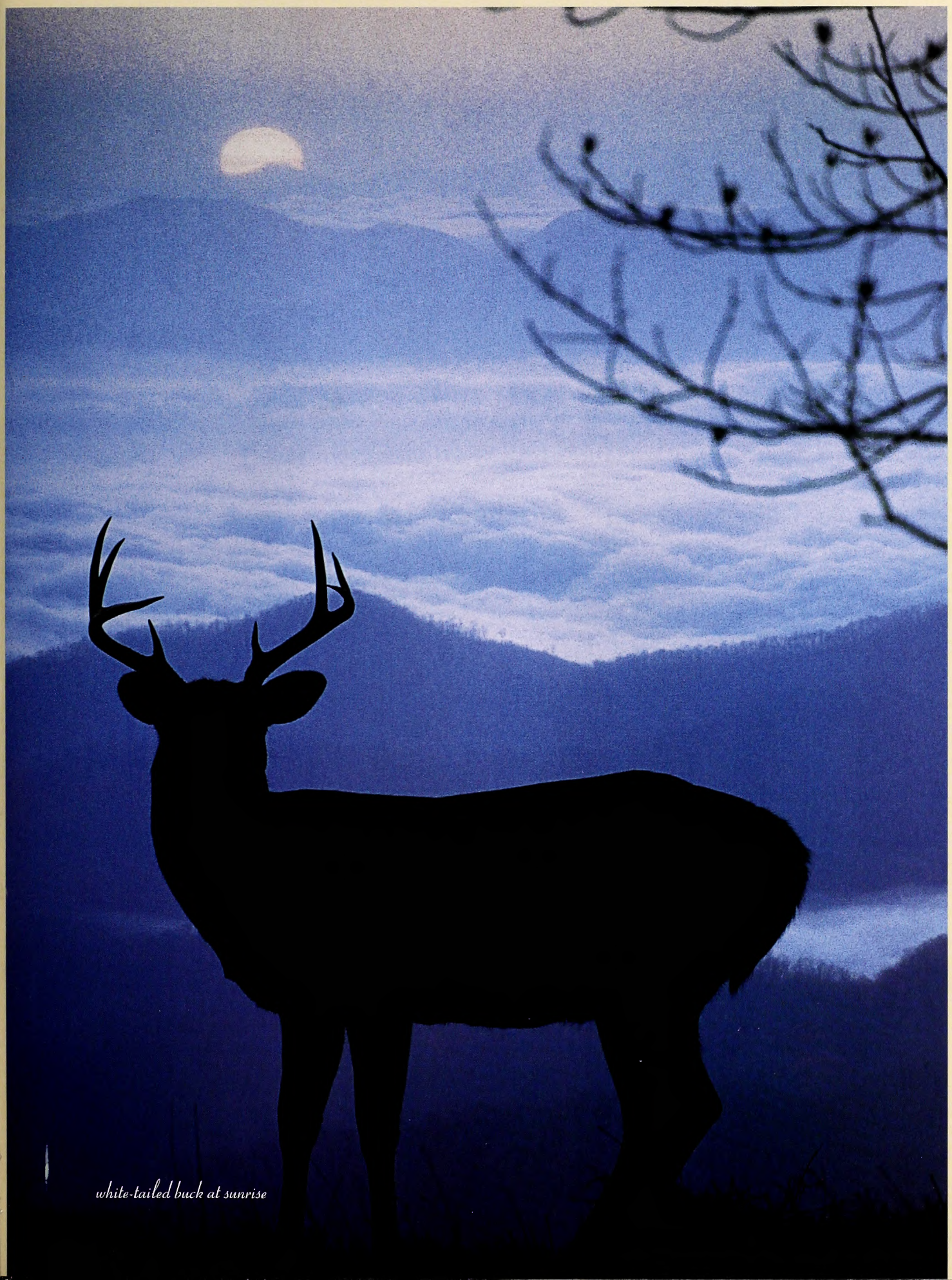


Whether spent along a secluded stream or atop a majestic peak, a day in the Great Smoky Mountains National Park can easily restore the mind and uplift the soul.



Catawba rhododendron in a spruce-fir forest

view from Clingman's Dome Tower



white-tailed buck at sunrise

Veteran impoundment anglers know that nothing works all the time. Success depends on finding the most effective technique for the season and for the depth and cover you're fishing. Sometimes working out those solutions takes time, but it also brings some of the most lasting angling satisfaction.

The variety of techniques applied is infinite, but here are three that have proven to work seasonally.

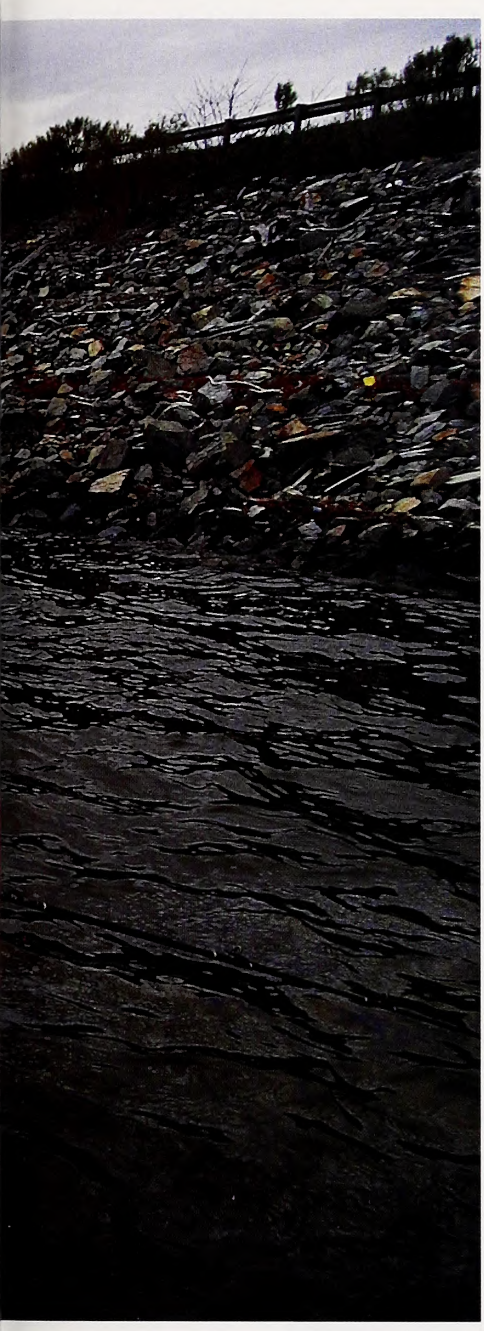
For anglers still perfecting their skills—and who isn't?—these techniques can be considered starting points for further development and refinement.

Early Spring Shoreline Structure

Fishing success on Piedmont reservoirs in early spring can be difficult to predict because good conditions occur suddenly between miserable days accompanied by a north wind. Even when you get southerly breezes, not all the fish awaken from their winter torpor at the same time. With water temperature at the surface typically in the mid-50s, and a lot colder below, only the first few fish are beginning to explore the shallows and feed a little. But experienced anglers often can find enough action to make the effort worthwhile.

Knightdale's father-son team of Gary and Alan Stephenson has fished Jordan and Falls lakes at least 20 times a year since their construction in the 1980s. Alan estimates they have fished Jordan more than 300 times. They have experience to rely on.

One morning we launch late. There's little rationale for beginning early when the water's cold. A southwest wind forecast to blow 15 to 20 mph rose about 10 a.m., just as the anglers begin casting spinnerbaits to the riprap lining the banks at highway crossings. Windward shorelines can be good prospects early in the season because the warmer water rises. Wind pushes the surface layers, piling the warmest water against the bank. Largemouth bass are



The Changeup Pitch

written and photographed by
Joel Arrington ©2001

The central reservoirs of North Carolina offer a variety of settings for anglers, and no one tactic works best for all. Here are a few tricks to add to your mental tackle box.

Seasoned anglers Gary and Alan Stephenson cast to shoreline riprap at Jordan Lake. Such windward shorelines can hold plenty of bass in early spring.

likely to be attracted to those edges both for the warmth and for the cover.

The Stephensons' target zone begins at the shoreline and extends offshore 20 to 30 feet. But instead of casting perpendicular to the shore, the anglers cast obliquely ahead, working the lure parallel to the shore and along the steeply sloping bottom.

"That keeps the lure in the strike zone for a greater percentage of the retrieve," Gary explains as he operates the trolling motor in the bow.

Twelve inches beneath the surface a fisherman would lose sight of his lure in the off-color water, which is why they fish a pattern called fire-tiger—a bright orange-yellow-fluorescent green lure. Using that color spinnerbait, Gary releases a 3-pound largemouth within minutes.

They could have pulled heavily weighted plastic worms through deep holes or trolled diving plugs, but their experience at this time of year urges them to cast to the shorelines. The Stephensons feel that at some time during the day fish will move into warmer water, and that we should be waiting for them.

"It may be later today, or maybe some day soon this week," Gary says. "Every bass in the lake will not move at once. But our best chances lie here on the windy shore."

So, although fishing slows after that first fish, we continue casting to shorelines. About noon, we run to a shallow arm of the lake. High, thin clouds soften the day's brightness as we work along more yards of riprap. We spot a carp roll up in a nearby cove; a bait jumping ahead of some predator. With the water warming, we continue casting to the shallows.

Alan releases a 3-pounder and, not long after, another bass that might weigh 3½

pounds. Other anglers we met on the lake confess to not getting a strike.

Then Alan catches the best fish of the day after we pull up to a riprap point under a highway crossing. He casts a white spinnerbait into the wind and slow-rolls it 10 to 12 feet deep in the eddy behind the point. At an estimated 5 pounds, it is a fish anyone could be proud of on a slow day. It is the product of experience and confidence in an early spring technique that anglers have relied on for years.

Winter Live-Bait Trolling

Stanley Winborne and Micou Browne, of Raleigh, were having difficulty a few years ago figuring out how to catch largemouth bass and striped bass on Falls Lake and other nearby reservoirs.

"We took a year trying artificial lures of all kinds," Winborne explains. "Jigs, diving plugs; you name it. Nothing worked."

They tried minnows, jigging them and trolling them with planers. Still no luck. The two anglers enjoyed some success catching hybrid stripers in Jordan Lake, but the striped bass in Falls Reservoir frustrated them.

One day they chartered Kerr Lake guide Chris Harward, who showed them how he employs side-planers and recommended a brand that he had adopted after trying others that didn't work. Rigged with a trolling lure or bait behind it, a planer is typically used to dive deep. But instead of diving, a side-planer travels sideways, allowing lures to be trolled beside the boat. Those side-planers rigged with live shad behind them proved to be invaluable to Winborne and Browne in subsequent years.

"If we can get the shad," Browne says, "we will catch the fish."

It took more than three cold hours of flinging a cast net before a single throw produces more than a dozen threadfin shad. But the effort was worth it, because 15 minutes later, a huge largemouth bass lay flopping in the bottom of the boat.

Fishing the bright yellow side-planers adjacent to the boat, I learn, is quite a production. Two more lines troll live baits directly behind the stern. Rods are light spin models with 8- or 10-pound test line. The array of lines sweeps a wide swath both horizontally and vertically behind the boat.

The planer is attached to the line 20 to 30 feet above the bait. When they get a strike, the planer is reeled to the boat where it is removed from the line, so that the fish can be fought.

"You'd think we'd have numerous tangles and snags," Winborne says, "but the system is amazingly snag-free."

A live shad, hooked through the nose, is trolled behind the planer. The shad seeks the depth it wishes, but tends to avoid almost all the submerged hangs. "Live baits try to join schools," Winborne explains. "Because they're different from the others, they attract the predators lurking around the bait schools."

"As the water warms," Browne adds, "we fish deeper by attaching weights ahead of the baits."

Before we come in this chilly day, the

***Using light tackle for** reservoir bass can be a lot of fun, but remember to bring a net. Once at the side of the boat, these bruisers get feisty and can take an expensive lure to a watery grave. Stanley Winborne (with net) and Micou Brown show how it's done on Falls Lake.*

two had released several small largemouths, an 8-pound striped bass and one largemouth we unanimously estimated at 9 pounds before Browne released it.

Another February day, with the water temperature as low as 42 degrees, the Raleigh anglers report a 15-pound, 28-inch striper and several largemouth bass. A week later they release two largemouth bass that they estimate at 6 and 4 pounds, and two catfish. Near the end of February, they catch striped bass measuring 24 inches and 34 inches, 10 largemouth bass and three catfish—respectable outings for a month when fishing is supposed to be slow.

Ultra-Light for Small Breaking Bass

Within five minutes of meeting guide Gordon Churchill at the boat ramp one August morning near the Harris Reservoir dam, 15-year-old Mariel Cerna releases her first fish. It is a feisty 2-pound largemouth bass she caught on a soft plastic lure cast with an ultra-light rod and 4-pound test line. In the first hour, the 15-year-old releases three bass.

"That was a lot more fun than fishing bait," she says. "There's something happening all the time."

Ordinarily on Piedmont reservoirs we don't find bass on the surface in hot weather. They usually swim deep to escape high temperatures and increased boat traffic, especially in midday. But Churchill advises us not to arrive at the ramp until 9 a.m.

"It's been dead early," he says. "Action just increases toward noon."

A few other boats are working the schools of small bass in the boat ramp cove when we launch that morning. Bass are attacking schooling shad on the surface, and water frequently erupts several feet high. Separated from their school by roving predators, we can see individual shad making V-wakes along the calm surface. Then Bam!

"The bass," Churchill says, "will feed on shad schools in a cove or off a point until they scatter the bait. Then it will be harder to catch them."

Anglers can look for shad concentrations elsewhere, he suggests, or wait until they have regrouped. Sometimes coves present the best opportunities; other times submerged points are better.

Anyone unfamiliar with the lake can just look for gatherings of boats. No one objects to other anglers joining the fun as long as they don't gun their engine in frenzied pursuit.

Using ultra-light tackle *and a soft plastic lure is one way to catch schooling largemouths during the summer, as Mariel Cerna (top) demonstrates at Harris Lake. Spinnerbaits can also be effective. During the winter, live shad can be trolled for schooling largemouth bass as well as stripers on Falls Lake.*

Often the bass will push shad to the surface and leap clear of the water trying to catch them. Shad will fly from the "breaks," catching the light and flashing a revealing wink to anglers nearby. On calm days one can hear the splashing melee at some distance.

A patient approach pays off. Eventually the predators will force the prey species to the surface beside your boat, and you will get a shot. An electric trolling motor is helpful. But anyone with a canoe or kayak could easily have launched at the ramp and fished the cove there for hours this August day, remaining in fish much of the time.

Churchill advises Cerna to cast her Zoom Fluke near the breaks and swirls, give it a twitch and let it sink. When water temperatures are cold, bass will conserve energy, usually preferring the easily obtained lure over the fleeing shad.

"When the line goes tight, just give it a sharp tug with the rod tip down," he instructs. "That light wire hook penetrates easily."

The Zoom Fluke can be cast only with light line. A 1/0 worm hook adds a fraction of an ounce to the 3-inch plastic lure. Together they may weigh less than 1/16 ounce. If you're to achieve much distance, 4-pound monofilament is about the maximum you can use.

The bass tend to run small. Several we catch weigh less than 2 pounds, although Cerna lost one Churchill estimates at close to 4 pounds when it swam between the boat and the electric motor and cut the line. A few days previously, Preston McQueen, of Raleigh, had caught a 5-pound Harris Lake bass on one of Churchill's size No. 6 Harris Lake Deceivers, a streamer fly. A week later, Tyler Chiarello catches a 4 1/2-pound bass with Churchill on a Zoom Fluke.

The impounded reservoirs of central North Carolina offer a variety of settings for anglers, and no one tactic works best on all of them. Anglers who experiment and remain open to change are unlikely to remain in an unproductive rut. And by placing a few twists in your fishing repertoire, good fishing can be found year-round. ⊠

CAPE FEAR

Fishing the spawning runs of American shad can provide a perfect way to welcome spring along the Cape Fear River.

The blooming of dogwoods signals the arrival of spring to many North Carolina sportsmen. To a turkey hunter, the glorious whitening of the landscape indicates the peak of the gobbling season. To a reservoir angler, the blossoms indicate that crappies are on the bite. However, to anglers who ply the Cape Fear River in the southeastern corner of the state, the dogwoods frosting the riverbanks announce that the shad run is at its zenith. Everyone who is tired of winter's chill and who can no longer wait to feel a bend in a fishing rod heads to "the lock" to try his luck at catching one of the states most underrated fish.

It has been 25 years since I caught my first shad at Lock and Dam No. 1 on the Cape Fear River. The drive through the adjoining countryside into the southern edge of Bladen County is deceptive, once the peaceful solitude of seldom-traveled back roads is shattered by views of pickup trucks with trailers jockeying for position at the end of Lock No. 1 Road. Three dozen boats are already in the water. Monofilament lines cast from them arc and glint in the spring sunlight.

Gracefully curling 10 feet above the dam, the water churns into a torrent of foam immediately downstream. As I approach the boat ramp beside the lock, the rumble of the river over the dam silences the singing of robins that I had been listening to through my open window.

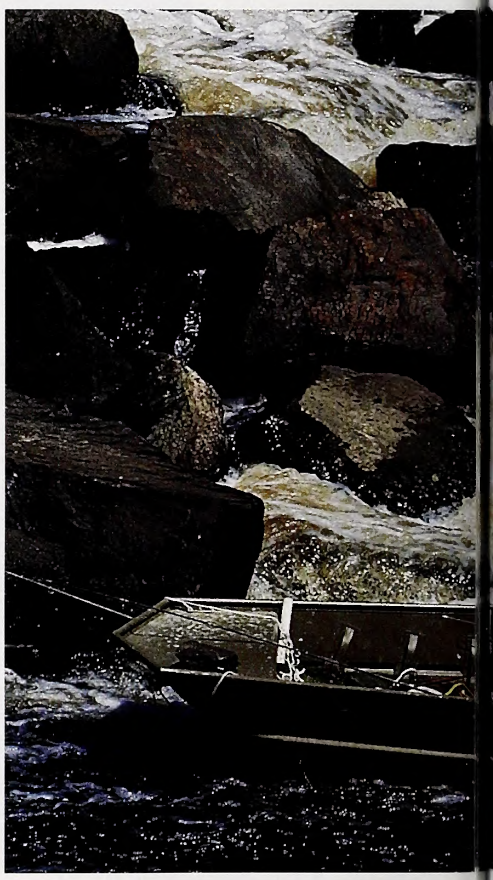
It seems unreasonable that a Coastal Plain boat ramp, screened from sight of the river by the wall of the lock, could be situated so far below the elevation of surrounding terrain. A fellow angler helps out by holding the bowline as I drive back up the steep grade to park the trailer alongside a dozen others in the overflow lot on the high bluff.

Before walking back down to try my luck, I observe the fleet of anglers to see who is catching fish. In spite of hundreds of casts, I noticed that just one fisherman is catching an American shad on nearly every cast. Others have some luck, but this angler seems to be catching as many as all the others combined.

Soon I am alongside the aluminum johnboat of the "lucky" angler, attempting to anchor my johnboat nearby to take advantage of his honey hole. However, the rocky bottom rejects the flukes of my anchor, and he begins to laugh. Shaking his head, he points to a spare cinder block on the bow of his boat. He shouts something as he points, but the words are lost to the river's roar. My anchor finally catches, the boat lurches and I nearly lose my footing.

I begin casting and reeling, casting and reeling—to no avail. I match the color of my shad dart to that of "Mr. Lucky" and cast to the same eddies in the water. He eventually heads back in with a full cooler, but I go home with nothing. In the seasons since, I have learned many things about shad fishing. My first lesson came during that initial unsuccessful trip to the lock. The lucky angler made one cast to my ten. Slow retrieves work best for catching shad.

Why the fish strike darts at all is a mystery. Darts are tiny jigs with only a hint of hair at the tail. Shad are nonpredatory fish that obtain their food by screening plankton from the water. The best lures are 1/8- to 1/16-ounce darts, colored heavily with yellow. Besides darts, shad also readily hit tiny crappie-style, curly-tailed grubs attached to lead jigs.



On more recent pilgrimages to the lock, my family has refined the art of the slow retrieve to its ultimate end—the nonretrieve. My wife, Carol, likes to lounge in the sun while "fishing." Asleep with her dart over the side and the rod in a holder, she was once

SHAD

written by Mike Marsh ©2001

KEN TAYLOR

rudely awakened by the buzzing of the drag clicker on her spinning reel. With her line hooked fast into a shad, she soon had the buck, or male shad, netted, then drumming about the inside of an ice chest with his tail.

We turned the event into a retrieve method that avoids two of the pitfalls of shad fishing, tangling lines with those of other anglers and snagging rocks. By casting the lure directly downstream of the boat and placing the rod in a holder, we keep the lure off the bottom and let the current give it action. Cranking the reel handle is a sign of boredom or impatience.

For catching shad, many anglers are tempted to use ultralight gear. Though lines as light as 4-pound test can land bucks, the heavier and more desirable "roes," or female shad, are caught more easily on 6- to 8-pound test line. The reasons are both the river current and the anatomy of the fish. The longer a shad is played on a light drag tension, the more likely the hook will wallow a hole in the mouth of the fish and fall free. With large roe shad weighing as much as 8 pounds, the fish can put a lot of strain on the line by turning sideways in the river current to resist the hook.

Safety demands the use of life vests when fishing near the dam. Anglers tempt fate by fishing right below the churning waters of the downstream side of the dam. A misjudged step or a freak water boil can easily send an angler into the whitewater.

Courtesy tells anglers to space their boats apart to avoid entangling lines. However, the

KEN TAYLOR

A fresh fried meal *cooked on the riverbank is just one of the many rewards of a successful day fishing for shad on the Cape Fear River. Spawning American shad typically congregate below the first lock and dam on the river (previous page and below) drawing a host of anglers in a traditional rite of spring.*

rocky bottom often dictates where anglers can fish. The best idea is to keep trying until a solid hookup is achieved, then let out additional line as a way of changing positions. Sometimes the shad congregate along one bank or the other, and at other times they are most plentiful in the center of the current. Watching other anglers is the quickest way to tell where the fish are concentrated. However, on a busy day, the best policy is to wait until a good spot is vacated, then move in to fill the gap.

Though the most common craft are johnboats, bass boats and skiffs are popular as well. Grapples with tines that bend to release or makeshift anchors such as cinder blocks are better choices than common anchor types. Anchors designed to hold sand bottoms can become hopelessly snagged. There is a king's ransom in anchor metal trapped among the boulders below the dam.

Many anglers avoid the hassle of anchoring and simply walk the bank below the lock or use their boats as ferries to gain walking access to the opposite side of the river. Others drift floating gill nets beside their boats on the river current far downstream of the dam.

A picnic lunch on the riverbank is a pleasure when the dogwoods are in bloom. A camp stove used to heat a skillet full of oil will soon have the savory aroma of fried shad and roe in the air. For many, the culinary value of a trip to the Cape Fear lock is as important as catching a shad.

There are tricks and tips to preparing a feast of shad. Shad are endowed with tiny, hairlike bones that cannot be defeated by even the most talented angler's fillet knife. So, the fish are scaled and cut across the body, perpendicular to the backbone, into steaks. The steaks are salted and peppered, then dredged in flour or cornmeal and set into simmering oil that is just cool enough to avoid burning the fish. The result is a very crisp, chiplike fish steak. The bones deteriorate and go unnoticed because of the crunchiness of the fish. The meal can be chewed and swallowed instead of picking out of a mouthful of fish. Some people also enjoy baked shad, placing a whole fish in a pan and smothering it with lemons, onions or barbecue sauce. The result is fish that is eaten by the scoop, with the bones being meticulously picked from each morsel.

However, many anglers do not like the strong flavor of shad and prefer to eat the eggs or roe. Indeed, shad roe is the delicacy that sends most anglers to the Cape Fear locks in April. The twin, golden roe sacks can simply be removed from the fish, then floured and fried. But many anglers also prepare hen's eggs, onion and shad eggs with a batter and deep-fry the mixture. The fish eggs pop when bitten, creating a sensation in the mouth that is unlike that of any other food.

Along with the traditional hush puppies and coleslaw, shad constitutes such a feast that the entire surrounding community is treated each year. Private benefactors from the nearby community of East Arcadia supply the makings of a shad cookout on the Monday following Easter. Held at a picnic area overlooking the river, this celebration is known as Blue Monday and draws a crowd of hundreds of people to the lock as a rite of spring. Though once there were plenty of shad to be caught on the day of the feast, some shad are now frozen in advance to ensure that there is enough fish to feed the crowd.

Shad are anadromous fish, migrating from salt water to fresh water to spawn. However, their spawning runs are impeded by three locks and dams built on the Cape Fear River by the U.S. Army Corps of Engineers many

KEN TAYLOR

MIKE MARSH

***Reaching up to** 8 pounds in weight, shad can use the swift current to put up quite a fight on light tackle.*

decades ago. The dams were built to keep water levels high enough to allow barge and riverboat traffic. The locks were originally equipped with special fish ladders, a stair-step series of baffles to help shad travel upstream. However, the original design was not effective for helping the weak-swimming shad. A second design was tested at Lock and Dam No. 1 in 1996 to help the shad negotiate the 11-foot climb, but it had little success. Also, the lockmasters operate the locks at intervals to lift spawning schools of shad and other fish upriver.

Because of today's lack of commercial traffic, the Corps of Engineers is considering removing the locks and dams from the Cape Fear River. The Corps is also planning to build a massive rock weir at Lock and Dam No. 1 to allow shad and other anadromous fish, including the endangered shortnose sturgeon, to move upstream. This should help restore the historic runs of shad and other anadromous fish, including sturgeon, herring and striped bass. But there are many hurdles to removing the dams themselves. Will other upstream dams be required to release adequate water to allow the shad to spawn? Will the city of Wilmington oppose the removal because its water intake is situated above Lock and Dam No. 1 to prevent saltwater intrusion into the town's water supply?

For those who cherish shad fishing on the Cape Fear River as a rite of spring, these questions must be answered with consideration for the future of this unique fish. ⊠

Fishing for Shad

American shad are managed jointly in the Cape Fear River as well as other coastal North Carolina rivers by the North Carolina Wildlife Resources Commission and the North Carolina Division of Marine Fisheries.

KEN TAYLOR

shad darts

In designated inland and joint waters, hook-and-line fishing for shad is under the jurisdiction of the Wildlife Resources Commission. Anglers must have a fishing license when using artificial lures and must also adhere to a 10-fish-per-day combined limit of American shad and hickory shad.

In joint and coastal waters, the Division of Marine Fisheries controls net fishing for shad. Regulations regarding net fishing for shad are variable from place to place and can be obtained by contacting the Division of Marine Fisheries at 1 (800) 682-2632.

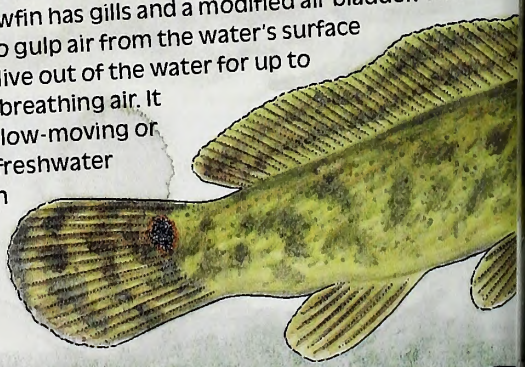
In December 1938 a fisherman brought his catch into port after trawling in the Indian Ocean near South Africa. As he unloaded his catch, a young woman who worked at the local museum noticed that one fish was particularly unusual. She sent a drawing of the fish to an **ichthyologist** at a nearby university. He recognized it as a coelacanth (*seel-uh-kanth*), a fish thought to have gone **extinct** more than 60 million years earlier, and until then only known from fossils.

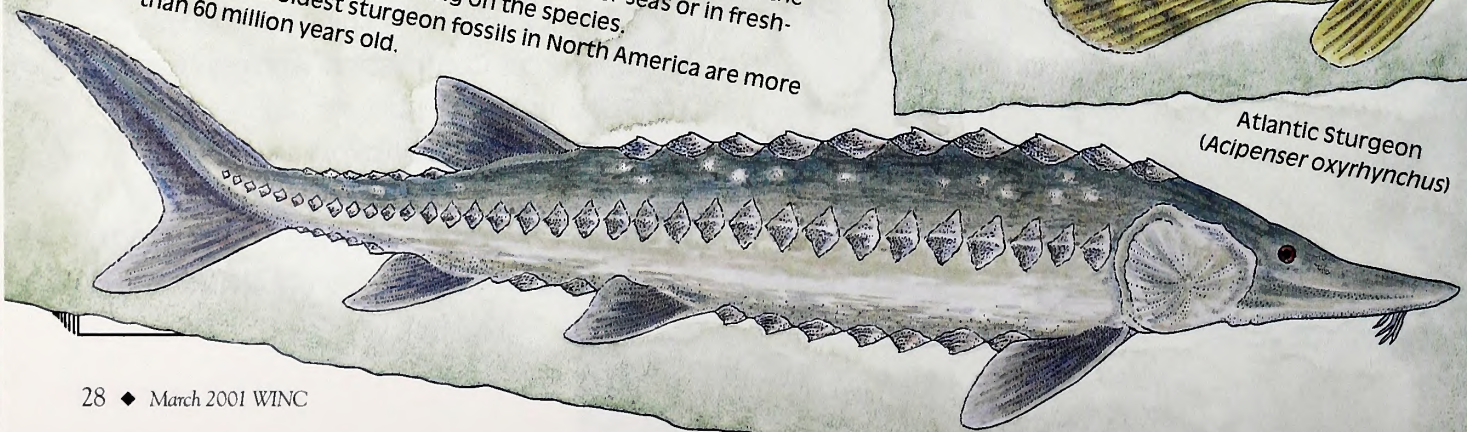
Amazing Ancient Fishes

written by Marianne D. Wallance ©2001
illustrated by Consie Powell ©2001
nature activity by Anne M. Runyon ©2001

STURGEON
Size: Up to 6 to 10 feet (1.8 to 3.0 meters) long
Sturgeons have stiff bony plates covering their bodies instead of scales. Like coelacanths and lampreys, they have flexible notocords instead of backbones. Feelers under the head sense when there is food, and a tubular mouth near the feelers sucks in the food. They live in the Northern hemisphere along the bottoms of saltwater seas or in freshwater lakes and large rivers, depending on the species.
Fossil records: The oldest sturgeon fossils in North America are more than 60 million years old.

BOWFIN (*Amia calvia*)
Size: 2.5 to 4 feet (0.8 to 1.2 meters) long
The bowfin has gills and a modified air bladder. This allows it to gulp air from the water's surface and even live out of the water for up to 24 hours, breathing air. It inhabits slow-moving or sluggish freshwater in eastern North America.





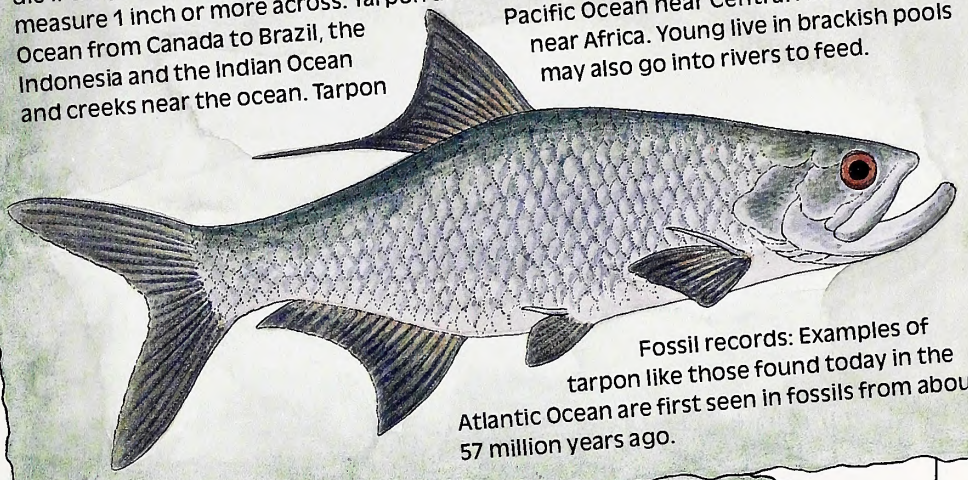
Atlantic Sturgeon
(*Acipenser oxyrhynchus*)

Take a Trip Back In Time

It is about 400 million years ago, a time called the "Age of Fishes." The ancestors of all the earth's modern fishes have developed, and fishes are the most advanced form of life on earth. Swimming in those seas, you see two main groups of fishes—jawless types like lampreys and jawed types like coelacanths and sharks. They all share three characteristics, though. They all live in the water, use **gills** for breathing and have a **notocord**.

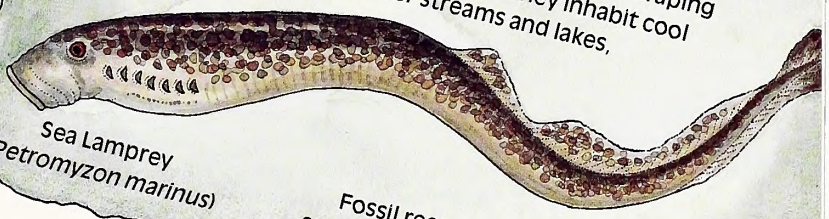
In those **ancient** seas, you also notice some differences, especially among the jawed fishes. Although most of the fishes have scales covering their bodies, those on the sharks are tiny, hard-to-see toothed scales, while those on many other fish are very large, 1 inch or more across. The methods of breathing are different, too. Some fishes stay underwater at all times, using just their gills to absorb oxygen from the water. Other fishes often swim up to the surface and gulp air, using their body's **air bladder** or **swim bladder** to store air and transfer the extra oxygen to the rest of their body.

Tarpon (*Megalops atlanticus*)
Size: Up to 8 feet (2.4 meters) long. Average length is 4 feet (1.2 meters)
The tarpon regularly comes to the surface to gulp air, sometimes leaping up out of the water. Surface air is passed into the swim bladder which acts like a lung. Tarpon will die if they cannot reach the surface to breathe air. They have large, coarse scales that measure 1 inch or more across. Tarpon are found in warm, coastal areas of the Atlantic Ocean from Canada to Brazil, the Pacific Ocean near Central America and Indonesia and the Indian Ocean near Africa. Young live in brackish pools and creeks near the ocean. Tarpon may also go into rivers to feed.



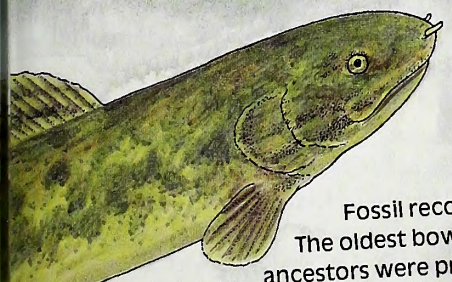
Fossil records: Examples of tarpon like those found today in the Atlantic Ocean are first seen in fossils from about 57 million years ago.

Lamprey
Size: 1 to 2 feet (0.3 to 0.6 meters) long
Lampreys are known as "jawless fishes" and are one of the most primitive fish alive today. Many "eat" the blood of fish by first sucking onto a fish and then scraping away the skin with teeth on their tongues. They inhabit cool waters in open oceans, freshwater streams and lakes, worldwide.



Sea Lamprey (*Petromyzon marinus*)

Fossil records: The oldest "jawless fishes" appeared over 450 million years ago.

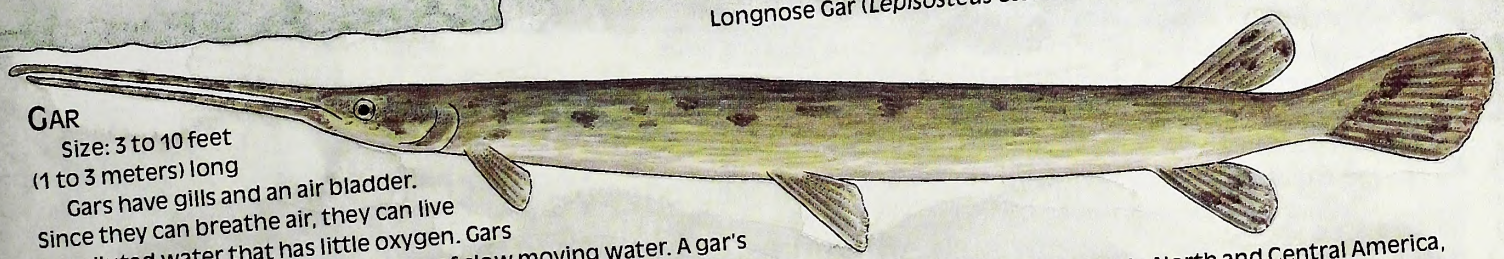


Fossil records: The oldest bowfin ancestors were probably from about 190 million years ago. More recent fossils were dated from 65 to 135 million years ago.

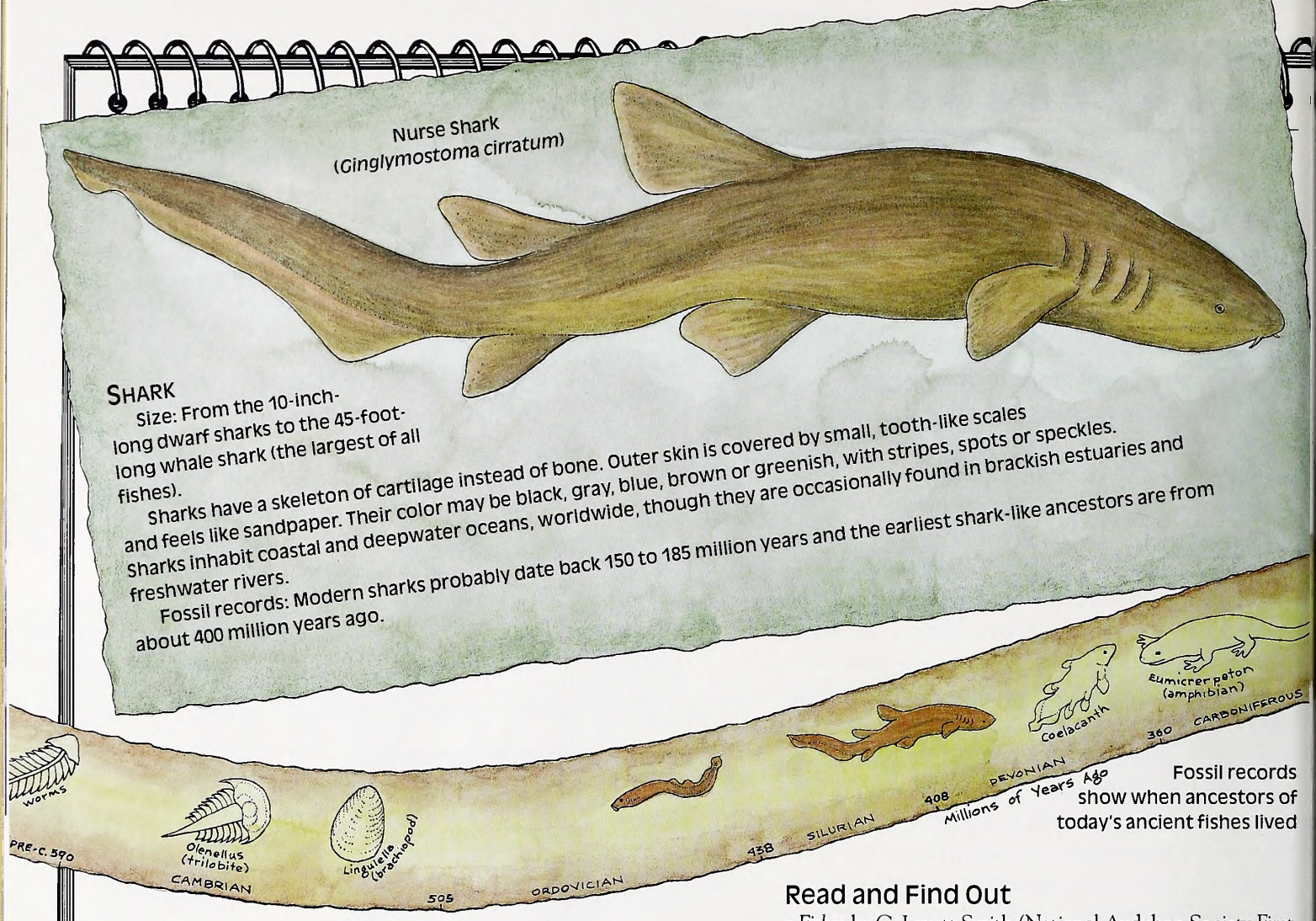
Return To The Present

As millions of years passed, most of the fishes of this early time went extinct and new forms evolved into the common fishes of today. However, not all of the prehistoric forms disappeared. The coelacanths may be the most famous of prehistoric fishes because they had been presumed extinct. But other types of ancient fishes are still swimming in the waters of the Atlantic Ocean and in the rivers and lakes of eastern North America. Amazing ancient fishes are found in lakes, rivers and estuaries of North Carolina as well as in the ocean off North Carolina's coast.

Longnose Gar (*Lepisosteus osseus*)



Gar
Size: 3 to 10 feet (1 to 3 meters) long
Gars have gills and an air bladder. Since they can breathe air, they can live in polluted water that has little oxygen. Gars will also float like a log at the surface of slow moving water. A gar's skeleton is part cartilage and part bone and it has tough, diamond-shaped scales covering its body. Gars live in weedy parts of warm, shallow freshwater rivers and lakes in North and Central America, from southeast Canada to Panama. They sometimes enter saltwater or brackish water.
Fossil records: Fossils date gars back to at least 85 million years ago, but they may be older.



What Does It Mean?

air bladder: the swim bladder is sometimes referred to as an "air bladder" when the swim bladder is being used for breathing (and not just to help the fish float). See "swim bladder" below.

ancient: very old; from long, long ago

brackish: a combination of freshwater and saltwater

gills: soft, finger like tissues in a fish that absorb oxygen from the water. They are found on both sides of the fish behind the head and are usually covered by a bony plate. Lampreys and sharks have slits in their skin instead of a bony plate.

extinct: usually refers to an animal or plant that no longer exists

fossil: preserved prehistoric animals and plants usually in the form of skeletons, shells or impressions. This could be either the entire animal or plant or just a part of it such as a tooth or a leaf. Fossils are found in rocks such as sandstone where minerals have hardened some of the animal or plant parts over time.

ichthyologist: a scientist who studies fishes

notocord: a bendable rod that runs down the length of fishes and helps support the body. It is eventually replaced by backbones or vertebrae in most fishes.

swim bladder: a balloon-like sac in a fish that can fill with air to help the fish float. In some fish it also absorbs oxygen and is used for breathing. In lungfishes, the swim bladder has evolved into a lung.

Read and Find Out

- *Fishes* by C. Lavett Smith (National Audubon Society First Field Guides), Scholastic, 2000.
- *Fishes: A Guide to Fresh and Salt Water Species* by Herbert S. Zim and Hurst H. Shoemaker, Golden Books, 1987.
- *A Field Guide to Freshwater Fishes: North America North of Mexico* by Lawrence M. Page, Brooks M. Burr and Roger Tory Peterson (Peterson Field Guides), Houghton Mifflin, 1998.
- *A Field Guide to Atlantic Coast Fishes: North America* by C. Richard Robins, B. Carleton Ray, and John Douglass (Peterson Field Guides), Houghton Mifflin, 1986.
- *Fossils: A Guide to Prehistoric Life* by Frank H.T. Rhodes, Herbert S. Zim and Paul R. Shaffer, Golden Books, 2000.
- *Living Fossil: The Story of the Coelacanth* by Keith S. Thomson, W.W. Norton and Company, 1991.

In *Wildlife in North Carolina*:

- "Big Bad Bowfin" by F. Eugene Hester, July 1995.

On the World Wide Web:

- *primitive fish*: www.state.ia.us/fish/iafish/primfish/primfish
- *coelacanth*: www.dinofish.com
- *shark*: www.beach-net.com/shark *and* www.reefquest.com
- *sturgeon*: www.mysterynet.mb.ca/sturgeon/evolution

Editing and design by Consie Powell.

Get Outside

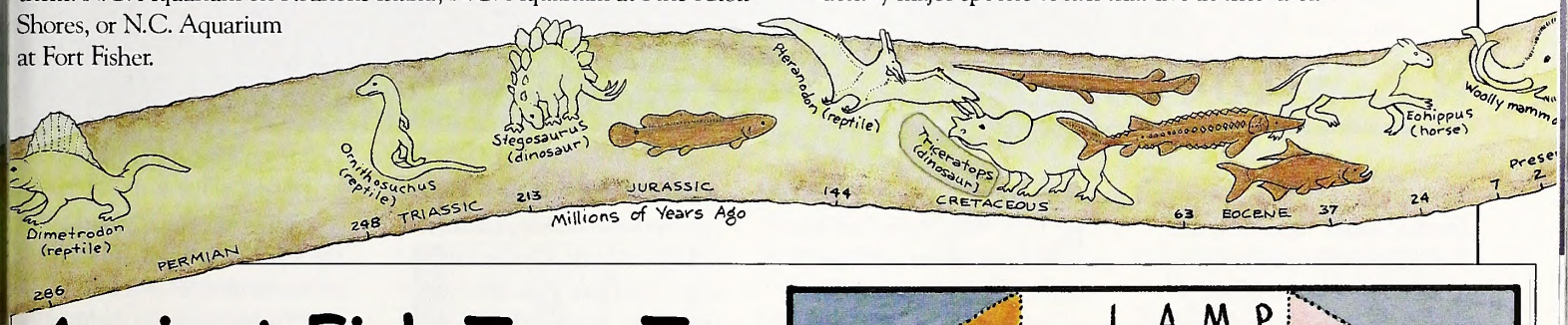
Visit the Aquarium: You may not be able to easily visit a wild fish habitat, but most aquariums have representatives of many fish types. Look at the fish closely—can you see the different kinds of scales? What about mouthparts and gills? What kinds of differences do you see? Take a sketchbook or journal, and make visual or written notes about what you see. North Carolina has three aquariums from which to choose. Visit one of them: N.C. Aquarium on Roanoke Island, N.C. Aquarium at Pine Knoll Shores, or N.C. Aquarium at Fort Fisher.

It's WILD!

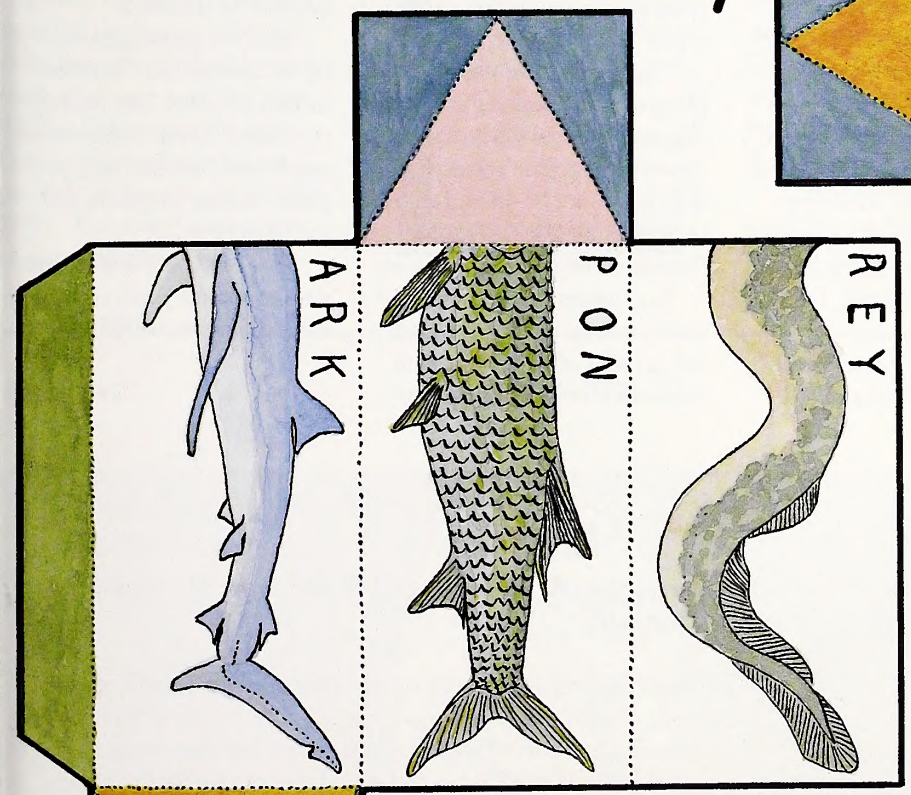
Project WILD Activities for teachers and students that correlate to this topic include:

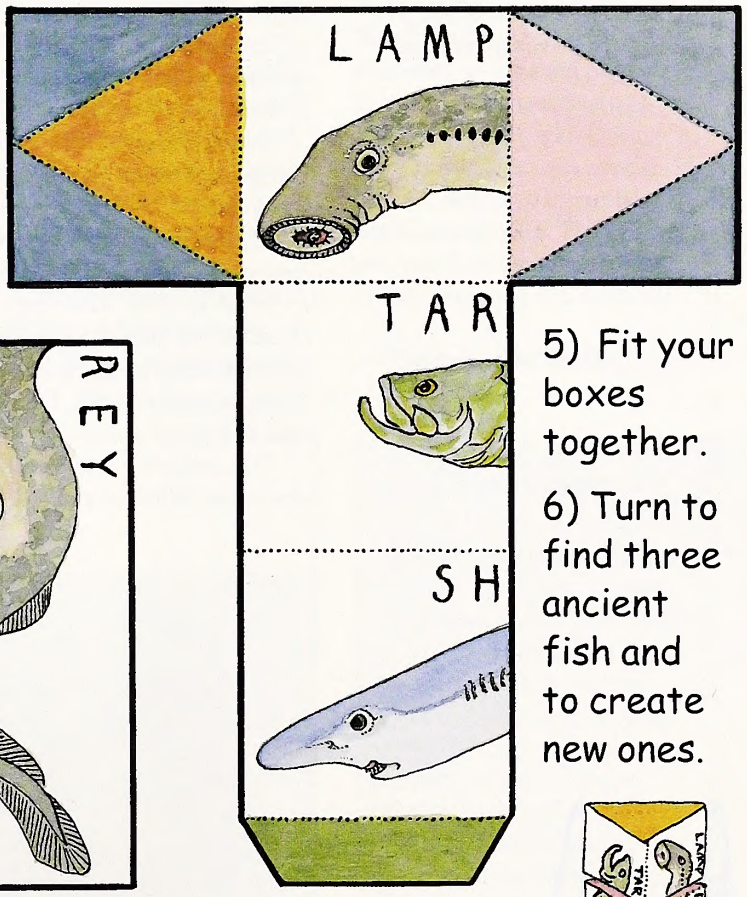
Mermaids and Manatees: teaches students how imaginary and mythological creatures may be inspired by actual animals.

Fishy Who's Who: teaches students to recognize and identify major species of fish that live in their area.

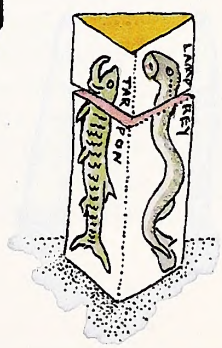


Ancient Fish Turn Toy





1) Cut out both shapes along the thick black lines.
2) Fold down along all the dotted lines.
3) Tuck under and glue shut the green tabs.
4) Tuck under and glue shut the blue tabs.
5) Fit your boxes together.
6) Turn to find three ancient fish and to create new ones.



N.C. WILD STORE

Posters, books, *reference guides, T-shirts and caps are just a few of the items available for sale on the Wildlife Commission's Internet Web site.*

N.C. WILD store products can now be purchased online, as part of an initiative to continually provide new resources through the Wildlife Commission's Web site.

Using a computer with Internet access, a visitor can access the online N.C. WILD store at the address http://store.yahoo.com/nc-wildlife/ and use a credit card to securely make purchases with a click of a mouse. Available items include posters, books, reference guides, T-shirts, caps and more.

"This really is a convenient way to buy WILD Store products and also subscriptions to *Wildlife in North Carolina* magazine," said Lee Ratcliffe, webmaster for the Wildlife Commission. "We have been very pleased with the success of the online WILD store so far."

The Wildlife Commission also plans to add vessel registration renewals online by May 2001. However, first-time vessel registration will not be offered online because a signature is required from the boat owner.

To constantly provide new environmental educational material, an atlas of North Carolina freshwater mussels and endangered fish has been added to the Wildlife Species and Conservation section of the Web site. This section also includes numerous habitat publications available to the public.

For those getting geared up for fishing, the Fisheries section is loaded with information about license requirements, regulations, fish stocking programs, angling programs and the latest news.

To access the Wildlife Commission's home page, visit the address: www.ncwildlife.org.

—Chris Powell

Edited by Chris Powell

On Patrol

Editor's note: *The situation below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

Wildlife officers Scott Isley and Mark Minton responded to a call about a person hunting geese out of season in Davidson County. The officers arrived at the suspect's residence and, while knocking at the door, noticed a freshly skinned squirrel on a table. (Squirrel season was also closed.) The officers began interviewing the man about the waterfowl violation and the squirrel, but the man would only admit to shooting the squirrel. The two officers left and went to the area where the goose was believed to have been shot. After interviewing a witness, the officers recovered the dead goose and returned to the subject's residence with the evidence. As they approached the man's residence, Officer Minton noticed a Wildlife Commission game land boundary marker sign nailed to a gate on the man's property, and jokingly commented that the only thing left to find now would be a deer. (You guessed it.) As Isley was issuing citations for the goose, squirrel and sign theft, a deer with a collar around its neck ran up to the gate of the barnyard. Then when the officers went to check the deer, Officer Isley noticed a set of hawk talons nailed to the wall of a shed. (This fellow had a bad day.)

N.C. Wildlife Society Named 2000 Chapter of the Year

The North Carolina Chapter of The Wildlife Society was recently named the recipient of the state chapter of the year award for 2000.

The North Carolina chapter received their award at the Seventh Annual TWS conference in Nashville, Tenn., on Sept. 13, 2000. The N.C. Chapter was selected from Wildlife Society state chapters, nationwide.

Founded in 1937, The Wildlife Society is a professional organization dedicated to the wise management and conservation of wildlife resources. "I am very proud of the hard work and dedication of our members which made this honor possible," said Wildlife Commission biologist Gordon Warburton, who was president of the chapter through 1999. "This award is the result of planning efforts extending back to the 1998 term of former president Carl Betsill."

The 1998 executive board wanted to rejuvenate interest and enthusiasm for the chapter and its activities. The chapter participated extensively in efforts to promote the Conservation and Reinvestment Act (CARA) by coordinating several membership letter-writing campaigns and by spearheading the effort to encourage former Teaming with Wildlife coalition members to become active once again. Besides sponsoring a session on "Wildlife and Urbanism in North Carolina," the group also sponsored a training session for wildlife damage control agents and continued to co-host the Barkalow lecture series at North Carolina State University.

Considered one of its most ambitious undertakings, the North Carolina chapter continued to participate in a Russian exchange program. Since 1996, North Carolina resource professionals have visited Russia to assist with management of certain national parks. During 1999, Russian foresters came to North Carolina to learn about forest management. This project generated enormous publicity for the chapter and its activities.

—*Courtesy of the Wildlife Society*

DONATED PHOTO

From left, Jon Heisterburg, *president of the The Wildlife Society's North Carolina Chapter; David Dudek, board member of the North Carolina chapter, and Gordon Warburton, former chapter president, were on hand to accept the 2000 Chapter of the Year plaque.*

Field Notes

- Hatchery-Supported Trout Waters .....Open April 7
- Wild Trout Waters .....Year-Round
- Wild Turkey .....April 14 Through May 12 (bearded birds only)
- Snow and Blue Geese .....Through March 10 (15 snow and blue geese, no possession limit)

Information on bag limits and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

Correction

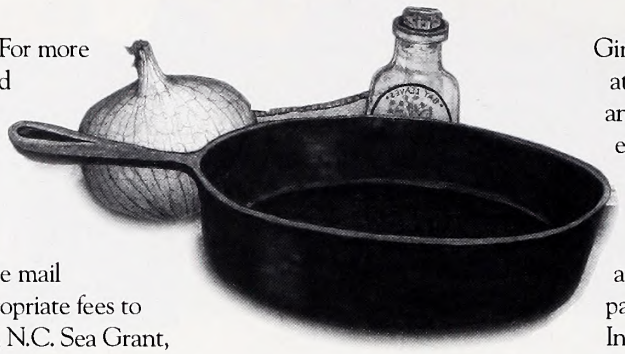
In the biennial report, which ran in the January 2001 issue of *Wildlife in North Carolina*, the Wildlife Commission's Division of Engineering Services incorrectly reported that the Smith's Creek boat access area in Beaufort County had been renovated with the addition of a handicap parking space. Instead, work is scheduled to begin within the next two years.

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

March 30-April 1

In North Carolina you can navigate more than 1,200 miles of coastal plain paddling trails. Celebrate these waterways and learn more about the potential of the state's coastal ecotourism at Coastal Plain Waters 2001. The 3-day event will feature a coastal paddling symposium and field trips. For more information and registration, check the Web site www.coastalwaters2001.ecu.edu/. Please mail form with appropriate fees to Lundie Spence, N.C. Sea Grant, Box 8605, N.C. State University, Raleigh, N.C. 27695.



March 16-18

The Catawba Valley Gem & Mineral Club Inc. will present the Unifour Parade of Gems 31st annual gem and mineral show at the Hickory Metro Convention Center in Hickory. The hours will be 9 a.m. to 7 p.m. Friday, 10 a.m. to 6 p.m. Saturday and 12:30 to 5 p.m. Sunday.

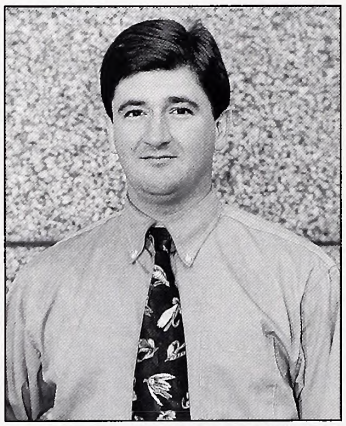
March 17

The Fifth Annual Wildlife Action Wildgame Cook-off will be held at the Boys and Girls Home Exhibition Center at Lake Waccamaw. Plaques and cash prizes will be awarded to the winning cook in the categories of fur, fin and fowl. There is a $25 cook entry fee, and all meals must be prepared on site to be judged. In addition, there will also be fun activities for the kids, live entertainment and much more. Revenues from the cook-off will be used by Wildlife Action chapters to fund programs such as Take-a-Kid-Fishing days and hunter safety courses. For more information, call Allison Greene at (910) 646-6458.

Rodney Foushee Named Editor of *Wildlife in North Carolina*

Wildlife Resources Commission employee Rodney Foushee has been chosen to head the Publications Section within the Division of Conservation Education. Included in his new responsibilities will be serving as editor of *Wildlife in North Carolina* magazine.

An award-winning journalist and outdoor columnist, Foushee worked as a newspaper reporter for the Waynesville *Mountaineer* and then the Wilmington *Morning Star* before joining the magazine staff in 1996 as an assistant editor. Since joining the magazine, Foushee had been promoted to associate editor and then managing editor and was responsible for gathering and editing articles and photographs for each magazine issue as well as writing feature stories and the monthly "Wildlife Through the Year" column. He holds a bachelor's degree in journalism from the University of South Carolina.



MELISSA McGAW

***Rodney Foushee** was recently named editor of* Wildlife in North Carolina *magazine.*

"It is a great honor to be chosen to serve as only the fifth editor of *Wildlife in North Carolina* in the past 50 years," Foushee said. "I am excited about working with our excellent staff of writers, designers and photographers to continue producing one of the best state wildlife magazines in the country."

He replaces Lawrence Earley, who retired in December after serving as editor since 1997 and associate editor since 1980.

As editor, Earley coordinated the monthly production of the magazine and special publications for the Conservation Education Division. He was also instrumental in developing the magazine's unprecedented 128-page Rivers of North Carolina special issue, which ran in November 1999. For producing the special issue, the magazine's staff was recognized by the N.C. Wildlife Federation, receiving the Governor's Conservation Communicator of the Year Award for 1999.

But Earley's monthly column "Nature's Ways" was likely his most familiar work to magazine readers. More than 200 of these natural history articles, spanning nearly 20 years, were republished by the Wildlife Commission in a six-volume set.

Earley said he plans to spend most of his time completing a book on the history of longleaf pines as well as writing feature articles.

"Although technically I'm taking an early retirement, I am really stepping down to finish a book I started some years ago and to pursue other writing projects," Earley said. "I will miss working with our fine staff, and I'll miss the collaborative nature of putting out a monthly magazine. But I hope to continue writing articles for *Wildlife in North Carolina*."

—*Chris Powell*

Deer-Related Vehicle Accidents on Rise

Automobile accidents involving deer across North Carolina continue to creep upward, according to a study recently conducted by the University of North Carolina Highway Safety Research Center.

In 1999, 12,233 deer-related accidents were reported, up from 11,503 in 1998. Deer caused 5.6 percent of all reported North Carolina driving accidents in 1999, which was slightly more than the previous year.

"From the many anecdotal reports we've received, these figures probably are just the tip of the iceberg when it comes to the real number of deer-motor vehicle crashes," said Donald Reinfurt, deputy director of the UNC Highway Safety Research Center. "That's because records are generated only when police officers write narratives about crashes and include the word 'deer.' When there's less than $1,000 damage and no injuries, which is often the case, the crashes are usually not reported at all."

Hyde County recorded 54 accidents involving deer and 88 that did not. Mecklenburg County, on the other hand, showed 27,289 total accidents, with 228 involving deer. Other counties with especially high rates were Caswell, Jones, Washington, Greene, Duplin, Gates, Chowan and Chatham.

"We recommend that people drive slower at night, when deer are more likely to be active," Reinfurt said. "If you see one run across the road, slow down because there usually are more following behind."

North Carolina's deer population now stands at between 950,000 and 1 million animals.

N.C. WILDLIFE RESOURCES COMMISSION

***A recent study indicates that** automobile accidents involving deer are on the rise in North Carolina.*

Scott Osborne, big game program coordinator for the N.C. Wildlife Resources Commission, said that between 10,000 and 12,000 deer are killed on highways each year, out of a total deer mortality of about 314,000.

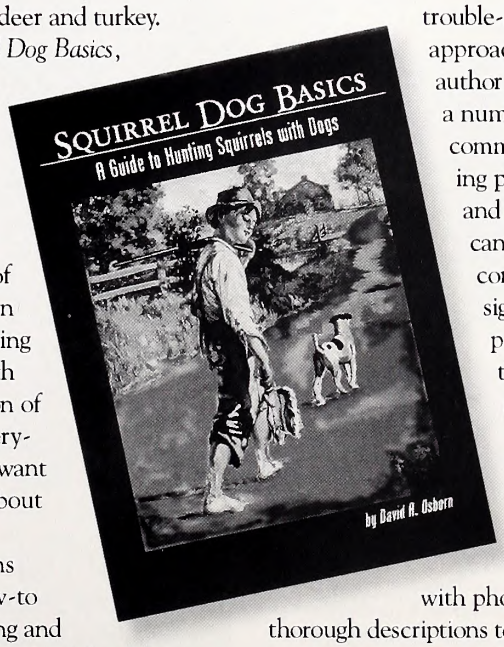
"The increasing number of accidents involving deer is likely due to a combination of factors, the most important of which is a steady increase in the number of vehicle miles driven on North Carolina's highways each year," Osborne said.

—courtesy of the University of North Carolina

Book Review: *Squirrel Dog Basics*

Squirrel Dog Basics *by David A. Osborn, Treetop Publications, P.O. Box 1496 Watkinsville, Ga. 30677, 153 pages, paperback 1999, $22.50. www.negia.net/~treetop/squirrelorderform.html.*

With rabbit and quail populations at historic lows, the gray squirrel is gaining new appreciation from sportsmen who enjoy hunting small game with dogs. Almost anyone can gain access to a few acres of woodlands just loaded with the bushy tailed tree-climbers. However the knowledge regarding how to select, train and hunt a squirrel dog is in short supply, with the old-school sportsmen fading away and modern hunters concentrating on the more popular species of deer and turkey.



Squirrel Dog Basics, by David Osborn, (now in its third printing) addresses that lack of information by presenting an in-depth compilation of almost everything you want to know about the sport.

It begins with a how-to for selecting and training a squirrel dog. Using a trouble-shooting approach, the author presents a number of common training problems and how they can be overcome. A significant portion of the book is also devoted to the various squirrel-treeing breeds, with photos and thorough descriptions to help the reader choose the right dog.

Also included is how squirrel dogs can be used most effectively in hunting situations as well as competitions. The author, a wildlife biologist at the University of Georgia, goes into considerable detail about the biology and management of squirrel populations. The book ends with step-by-step photos of how the animals should be dressed, followed by a number of savory recipes.

But one word of warning: After reading *Squirrel Dog Basics*, you might unexpectedly find yourself spending hours in the backyard with a new dog, praying that hunting season will hurry up and get here.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through July 2000

Principal Balance
$30,353,145.53

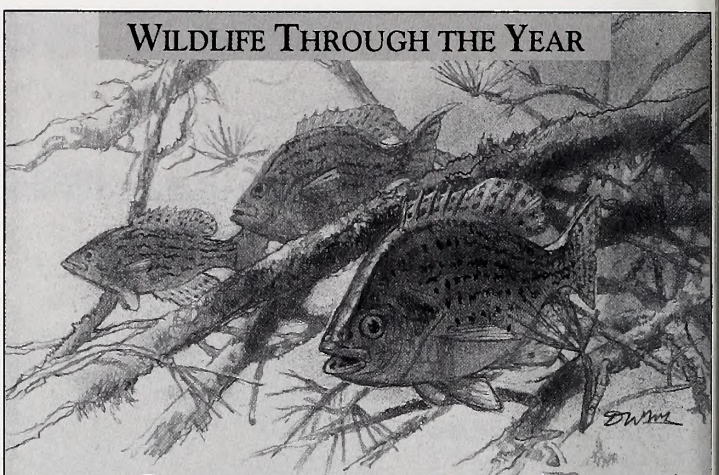
Interest Earned
$31,265,396.00

Total Receipts
$61,618,541.53

Interest Used
$20,436,178.04

Fund Balance
$41,182,363.49

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Creating Honey Holes

by Rodney Foushee

Now that you've collected discarded Christmas trees, it's time to sink them in your favorite pond or lake to create structure for some excellent fishing this summer.

Before you begin sinking trees, here are some pointers to ensure you get the most return on your efforts.

Materials: Evergreen trees can provide some of the best, most economical structure to attract and hold schools of crappies, bluegills and bass in your favorite body of water. Freshly cut deciduous trees including willows and pin oaks will also attract fish. Other materials that can be used include brush piles and stake beds.

Construction: The key to sinking structure is to make sure it is properly weighted and secured to stay put on the bottom. One of the best ways to anchor trees is to use a cinder block and galvanized steel cable. Drill a pair of holes through the base of the tree spaced about 10 inches apart to run the cable through the tree and the concrete block and then back through the tree before joining the ends. Avoid using rope, since it will rot and release the tree into the lake or pond.

Placement: To attract crappies, you need to make sure your trees are placed upright on the bottom. For bass and other species, horizontal structure will do fine.

For farm ponds, sink trees or other material in 6 to 10 feet of water in areas free of existing structure to attract fish. In larger lakes, place structure in depths of 12 to 20 feet, in areas with little or no current. For safety's sake, use caution when sinking structure and make sure that it will not be exposed during low-water conditions to avoid creating a hazard to boaters. In all cases, make sure you obtain permission from the lake or pond owner before you sink any structure. (Public reservoirs are usually controlled by a utility company, local government or the Army Corps of Engineers.) Finally, it is a good idea to draw a sketch of the shoreline so you can locate the structure during the fishing season. A Global Positioning System unit along with a depth finder can be very helpful in marking and finding structure.

With the proper construction and placement, you should have a first-rate honey hole of your own.

N.C. WILD STORE

NEW!

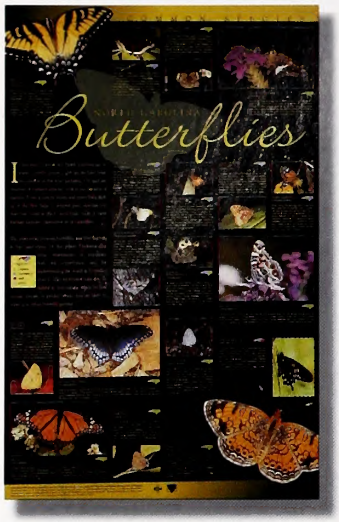
The third poster in our "Sporting Heritage" series...

SPORTING DOGS OF NORTH CAROLINA *Pointing and Retrieving Breeds*

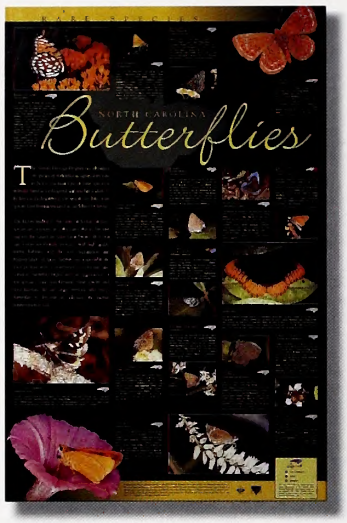
Setters, retrievers, pointers and spaniels—these loyal companions fascinate us with their instinctive ability to point or flush and retrieve upland birds and waterfowl. This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds in striking color. Each portrait includes a description of the breed's habits and history, making this handsome poster useful for reference and for show. (The second poster in this set will present trailing and treeing breeds. Look for it later this year.) See our other "Sporting Heritage" posters on page 38. $10 ITEM CODE **P18**

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org



Common North Carolina Butterflies
$8 ITEM CODE **P15**



Rare North Carolina Butterflies
$8 ITEM CODE **P16**

Butterflies Poster Set
$14 ITEM CODE **P17**

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlights the connections between the butterflies and their habitats. Posters are 22" x 34".

Gardens for Butterflies
An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set. Guide also sold separately.
$2 ITEM CODE **M5**

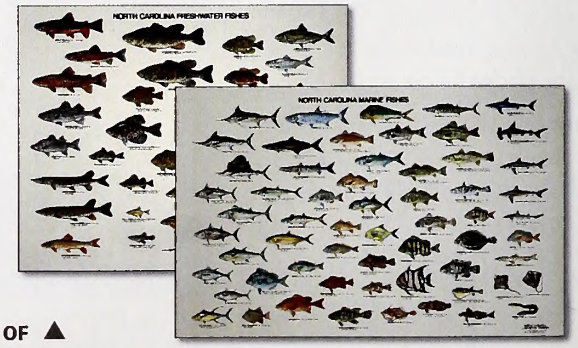
Amphibians of North Carolina
The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34".
$6 ITEM CODE **P11**

Amphibians of North Carolina
True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34".
$6 ITEM CODE **P14**

Reptiles of North Carolina
Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".
$18 ITEM CODE **P10**

Waterfowl Decoys of North Carolina
Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34".
$10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians
Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34".
$10 ITEM CODE **P13**

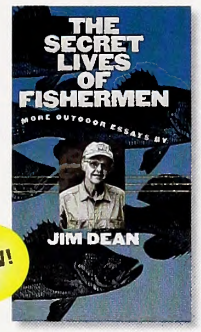


Fishes of North Carolina
Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").
$10 ITEM CODE **P9**

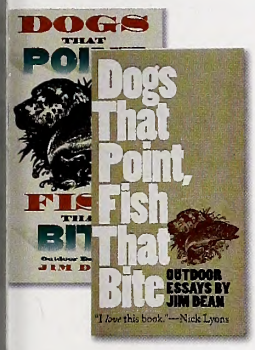
The Secret Lives of Fishermen ▶

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound.

$24.95 ITEM CODE **M13**



NEW!



◀ Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.

Hardbound $19.95 ITEM CODE **M8**

Paperback $10.95 ITEM CODE **M12**

All Things Are Connected ▶

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred teacher's guide, this film is a must-see for everyone.

$22 ITEM CODE **W3**

◀ Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.

$20 ITEM CODE **N9**

Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.

$2 ITEM CODE **M6**

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.

$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each

Cub & Boy Scout Correlation ITEM CODE **E9**

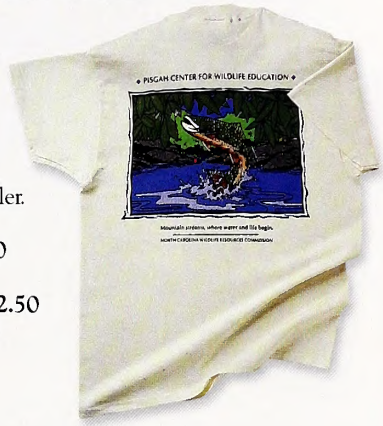
Girl Scout Correlation ITEM CODE **E10**

Pisgah Center for Wildlife Education T-shirt ▼

100% cotton beige tee with colorful design on back (featured here) and Pisgah logo on front. Adult sizes.

$14.50 ITEM CODES:

A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)



Wee Tees

Just like the adult shirt, only smaller.

ITEM CODES:

A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50

Embroidered Caps

Wildlife in North Carolina Caps ▶

Exclusive designs and magazine logo are featured on four different cap styles.

$16.50 each

A11

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE **A11**
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

A3

A6

A7

A1

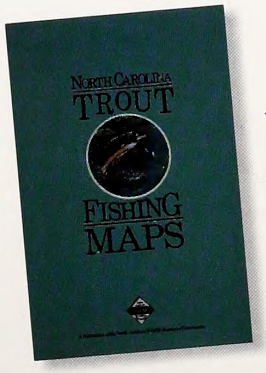
A10

◀ N.C. WILD Caps.

N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.

$16.50 each

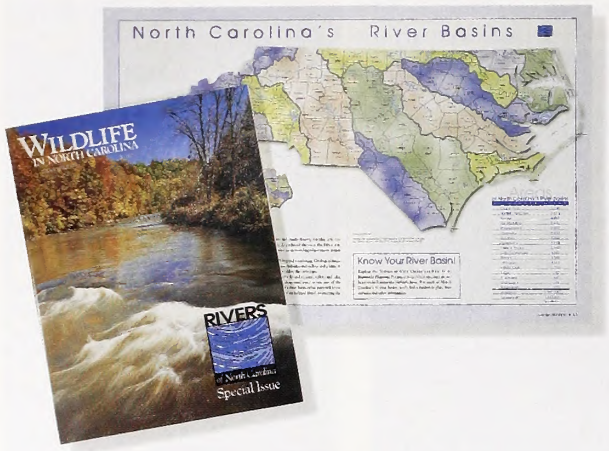
- Tan cap with forest green bill. ITEM CODE **A1**
- Tan cap with burgundy bill. ITEM CODE **A10**



◀ North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.

$12 ITEM CODE **TMAP**



◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina,* some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

2000 Migratory Waterfowl Print and Stamp Set ▶

This limited edition print signed by artist Ron Louque depicts the grace and color of canvasbacks in flight at North Carolina's historic Whalehead Club. Purchasing this collectible print and stamp set for your home or office will support the Wildlife Commission's efforts to manage wetlands and restore waterfowl populations. ***This item is not subject to 15% discount.***

$145 ITEM CODE **DSP00**

North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

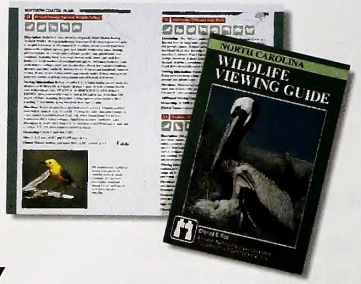
Explore the diversity of the state's natural communities in an 82-page soft-cover book written by naturalists and journalists. This guide describes13 habitats across the state with captivating illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a North Carolina WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

$16 ITEM CODE **E6**

North Carolina Wildlife Viewing Guide ▼

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**



Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

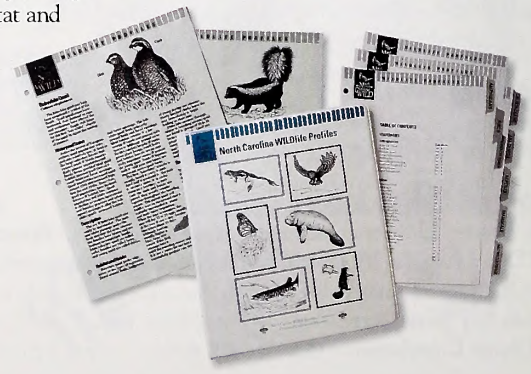
Unboxed set. $27.50 ITEM CODE **M9**

N.C. WILDLife Profiles Binder & N.C. WILDLife Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**



WILDLIFE COMMISSION SPOTLIGHT

Protecting a Vanishing Bird

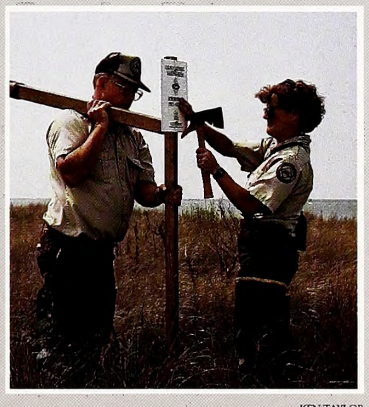
With piping plover numbers on the decline all along our coast, the N.C. Wildlife Resources Commission is working hard to protect this tiny shorebird.

One of the rarest birds that breeds in North Carolina is the federally threatened piping plover. The Nongame Section of N.C. Wildlife Resources Commission began keeping tabs on these little shorebirds in the mid 1980s. Since then, biologists have found as many as 57 breeding pairs in any given year. But the last several years have shown sharp declines, and this past year there were only 24 breeding pairs in the state. Worse yet, these 24 pairs only produced 13 chicks that survived long enough to learn to fly. Models show that this rate is not enough for the population to sustain itself. That's why the Wildlife Commission is working hard to protect plover nesting habitat along our coast.

JAMES PARNELL

Piping plovers only lay their eggs on the bare sand and shell on our beaches. But increased human activity has reduced the available habitat for piping plovers, as well as introduced more predators that eat eggs, chicks or even adults.

Most of the piping plovers we still have in the state now nest on Cape Lookout and Cape Hatteras National seashores. In the recent past, piping plovers also nested on Sunset Beach, Holden Beach, Oak Island, Figure Eight Island, Hutaff and Lea Islands, Topsail Beach and the Currituck National Wildlife Refuge. Only through careful conservation measures can we maintain these sites for future nesting birds.



KEN TAYLOR

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

RETURN THE GIFT

Wildlife is a gift often taken for granted. Please return it. The Nongame and Endangered Wildlife Program is dedicated to conserving native wildlife of North Carolina. Lend your support to this effort through a tax-deductible contribution on your North Carolina income tax form or send your contribution today to Nongame and Endangered Species, N.C. Wildlife Resources Commission, 1724 Mail Service Center, Raleigh, N.C. 27699-1724.

Lone Bugler

With the full moon overhead, a bull elk bugles atop a grassy mountain slope. For the first time in more than 100 years, elk will again roam the Smoky Mountains. The story begins on page 4.

LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
CONOVER, NORTH CAROLINA

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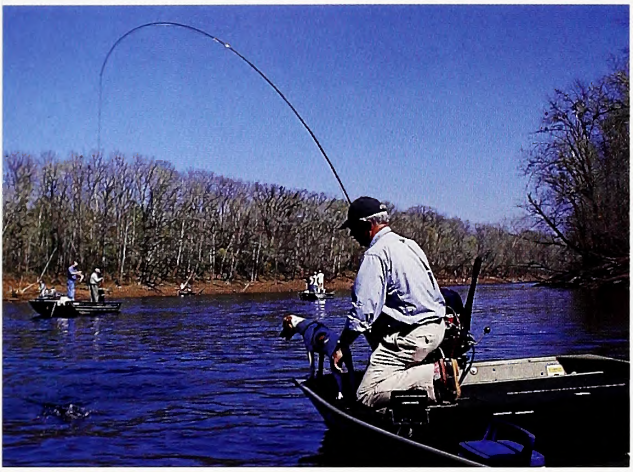
WILDLIFE IN NORTH CAROLINA

APRIL 2001 $1.50

The Amazing Roanoke

by Jim Dean ©2001



JIM DEAN

Charles Toney swung his big johnboat around in the current on the Roanoke River last May so that we were facing upstream, then signaled for me to lower the electric trolling motor into position. Charles and his fishing buddy Jackson—a Jack Russell terrier—had offered to reintroduce me to the river's striped bass, or rockfish as everyone called them in Weldon and my hometown of Roanoke Rapids a few miles upstream.

"This has always been a good stretch for stripers," Charles said. "Of course, I guess you remember that. I keep forgetting that you grew up fishing this river."

"Yes, but that was a long, long time ago," I replied. "This isn't the same river I remember. It has changed so much I hardly recognize it, and we never fished this way, either."

We unlimbered 9-foot, 9-weight graphite fly rods and began to cast. Our reels held modern fast-sinking lines that quickly carried our flies—pink and chartreuse Clouser minnows—into the depths despite the current.

As we swept down the river, we began catching stripers in the 2- to 4-pound class on almost every other cast. Though the fish were not large, they were strong and they knew how to use the current. Now I understood why Charles had discouraged my original notion of using a 6-weight rod for these fish.

"It's not that the stripers are so large," he had explained. "It's just that it takes too long to land fish with a light rod, and you kill too many fish. During the peak of the run, it's not unusual to catch 100 or more fish a day on flies, and occasionally much bigger stripers, too."

"There is some evidence that the striper fishery was already in decline in the '60s, and by the mid-1980s, it was in such bad shape some felt it might never recover. Yet it has."

How odd that would have sounded to my grandfather. We had fished the Roanoke regularly from the late 1940s into the mid-1960s. The stretch of the river roughly from the Highway 301 bridge downstream a mile or so to the Big Rock was, and still is, the primary spawning area that attracts most of the fish, and it was not an idle boast for Weldon to proclaim itself "Rockfish Capital of the World." During the peak of the run, businesses closed, and the river was filled with boats, many fishing commercially by drifting with big bow nets.

Back then, the water was invariably muddy, and it was polluted almost beyond imagination by pulp waste from mills upstream. Often, the river was completely covered with brownish white foam that piled up in the eddies like giant blocks of Styrofoam. The water was also thick with a syrupy slime—a byproduct of mill waste—that fouled lines and nets. Most anglers fished with cut bait or bloodworms because it was virtually impossible to use lures in the muck.

There is some evidence that the striper fishery was already in decline in the '60s, and by the mid-1980s, it was in such bad shape some felt it might never recover. Yet it has. Upstream lakes were filtering the sediment, and after the pulp mill waste began to be treated, the river cleared noticeably. The N.C. Wildlife Resources Commission outlawed commercial fishing and imposed strict limits and seasons on recreational fishermen to protect existing stocks of wild stripers. Equally important, the agency managed to arrange an agreement that water flows would be maintained at optimum levels to benefit spawning during the critical spring period. The result has been outstanding striper fishing.

But that's not the whole story. On the same piece of water a month earlier, Jack Avent and I caught dozens of hickory shad in advance of the striper run. Jack used ultra-light spinning tackle with 6-pound test and small spoons or shad darts, while I used small flies rigged in tandem and a 6-weight fly rod. Fifty years ago, dip netters caught lots of gizzard shad, but no hickories. When I returned home from the Army in the late '60s, I recall trying to catch hickories in the Roanoke using small spoons and darts. I had been catching them in Virginia, Maryland and Pennsylvania, and I hoped I might find some closer to home. Maybe the water was too fouled, or I fished the wrong spots, but I never caught any or heard of anyone else doing so. I still don't know if they were here then or not, but they certainly are now.

I doubt I'm the only old river rat who looks at the Roanoke with wonder these days. It's a pity my grandfather and his generation couldn't see it.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *A great horned owl has forward-facing eyes for keen, binocular vision to catch its prey. Photograph by Derrick Hamrick.* ©2001

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The Sum of Many Parts

written by Terry Krautwurst ©2001
illustrated by David Williams

Kingdom, phylum, class, order, family, genus, species. Every biology student has learned these stair steps of taxonomy, the classification of organisms leading from the general—every creature on Earth—to the specific, or species—single kinds of life forms, each unique.

It's a simple idea—this sorting of Nature's socks drawers, and an important one for scientists seeking to make some order of a world containing many organisms.

18th century Swedish biologist Carl Linnaeus first undertook the task, and he fell to it with fervor. The largest challenge was not in the actual naming, to which he applied the now-familiar genus-species binomial system, but in sorting out the similarities and differences that placed a given organism in some groups and not in others—and that ultimately defined it as a species. What properties put box elder and Norway maple in the same genus (Acer), and what distinguished them as individual species (*A. negundo* and *A. platanoides*)?

For Linnaeus and his contemporaries, looks were everything. Each species was a fixed creation, anatomically distinct and invariable. Careful observation and measurements defined the "essence," or ideal form, of a plant or animal.

Using these criteria, Linnaeus designated some 7,700 plant and 4,400 animal species names, most of which are still used. But over the next two centuries, a boom in scientific exploration and the discovery of thousands of new species revealed that life on Earth was far more complex and diverse—and not so easily categorized.

For much of the past century, the working definition of a species reflected the biological concept voiced by ornithologist Ernst Mayr in 1940 as a group of interbreeding natural populations that is reproductively isolated from other such groups because of physiological and behavioral barriers.

Members of a species, then, breed only among themselves—and thus protect and perpetuate their gene pool over time, generation to generation. If different species do crossbreed, the resulting hybrid is sterile or otherwise doomed to reproductive failure. Witness the oft-cited mule, the barren offspring of a mare and a jackass.

Interbreeding remains a major criterion for delineating many species, but falls short as a defining element for all. The concept can't apply to asexual organisms—eliminating thousands of life forms, including three entire kingdoms (fungi, bacteria and protoctista). What's more, crossbreeding is not uncommon among plants—various oaks hybridize, for example. Animals, too, rarely but sometimes mingle genes, usually where separate ranges of similar species—such as wolves and coyotes—overlap.

The search for a more inclusive species concept has fostered several alternative schools. Some biologists sort species strictly by evolutionary lineage; some by ecological niche. Others say that species are demarked by the emergence of "synapomorphies"—distinctive physical or genetic traits, perhaps no more than a single gene mutation, common to a single population.

Meanwhile, in the field, theory gives way to practical application. Biologists combine traditional observation with modern tools to build as complete a picture as possible of an organism's rank in the scheme of things. Protein and DNA analysis yield not only genetic identity, but also reproductive and evolutionary history. Computers provide the power to sort masses of statistical data from complex population surveys.

In the end, a species is the unique sum of many parts, tied through time by a persistent genetic heritage but also marked by distinctive physical features, behavior and ecological relationships. All these traits constitute a species.

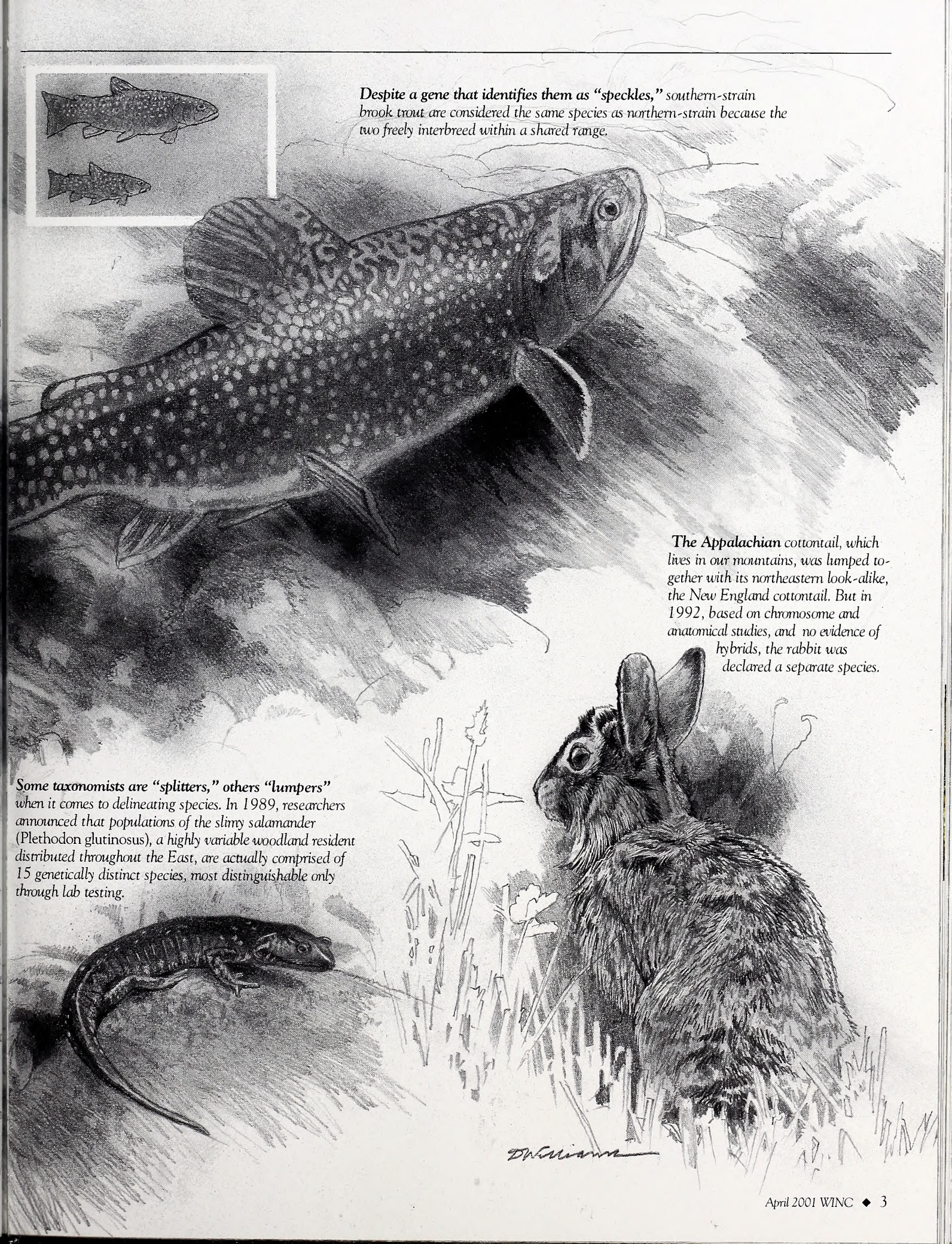
And then, there are the intangibles—the fire in the eyes of a red-tailed hawk (*Buteo jamaicensis*), the tremble in the leaves of a yellow poplar (*Liriodendron tulipifera*), the squirm in an earthworm (*Lumbricus terrerestris*). Perhaps these, too—at least to us *Homo sapiens*—are what make a species a species.

Other Reading:

- Ernst Mayr, *This Is Biology: The Science Of The Living World*, The Belknap Press Of Harvard University Press, 1997.

Surfing the Web

- For a review of species concepts from the 18th century through the present, see "The Species Problem: Selected Definitions," a Southern Illinois University Herbarium web page. Address: *http://www.science.siu.edu/herbarium/potpourri/speciesd.htm*
- For a discussion of species and a defense of the "biological concept" by its originator, Ernst Mayr, see "What Is A Species, And What Is Not?" Address: *http://www.aaas.org/spp/dspp/dbsr/EVOLUT/mayr.htm*



Despite a gene that identifies them as "speckles," *southern-strain brook trout are considered the same species as northern-strain because the two freely interbreed within a shared range.*

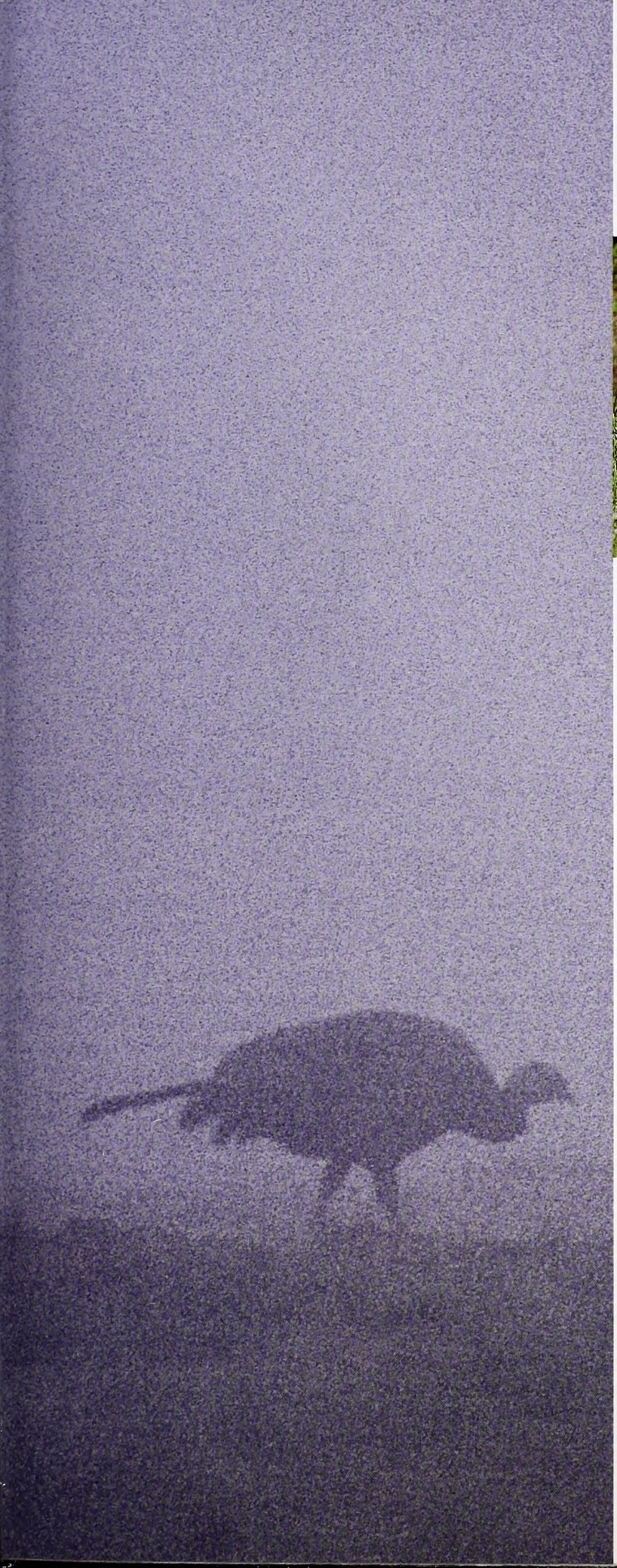
The Appalachian *cottontail, which lives in our mountains, was lumped together with its northeastern look-alike, the New England cottontail. But in 1992, based on chromosome and anatomical studies, and no evidence of hybrids, the rabbit was declared a separate species.*

Some taxonomists are "splitters," others "lumpers" *when it comes to delineating species. In 1989, researchers announced that populations of the slimy salamander* (Plethodon glutinosus)*, a highly variable woodland resident distributed throughout the East, are actually comprised of 15 genetically distinct species, most distinguishable only through lab testing.*

Bad Weather *Birds*

written by Gerald Almy©2001

Don't let less-than-ideal weather conditions ruin your turkey hunt this spring. Here are some tactics to make the most of bad weather.



SCOTTY LOVETT

LLOYD B. HILL

Imagine the perfect spring turkey-hunting day and it would be something like this: Bright blue skies. Crisp, but not too cold. Just a hint of wind to keep the insects at bay. Not a cloud to be seen.

Reality is rarely so kind. Instead of such ideal weather, a more likely scenario would involve rain, sleet, fog, extreme heat, bitter cold, howling winds, lightning or some witches' brew of several of these unfavorable conditions.

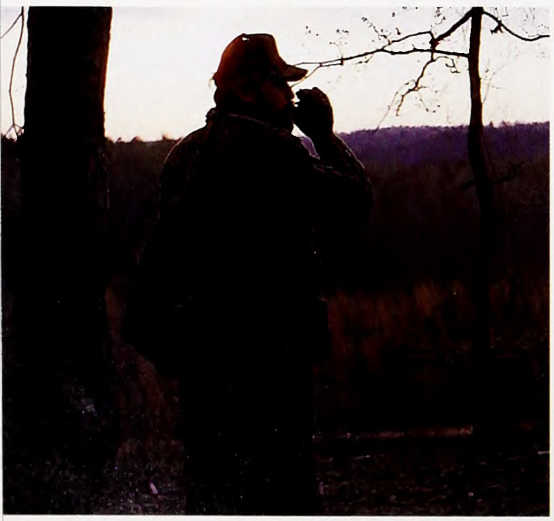
At least that's the way it's been for me throughout more turkey-hunting seasons than I care to count. Fact is, you have a choice. You can confine your turkey hunting to good weather and miss a large portion of the season. Or you can learn to cope with it.

The truth is, bad weather doesn't necessarily mean bad hunting. Actually, some of the biggest toms I've taken and most memorable hunts I've had have been on days when it was rainy, hot, foggy, bitterly cold, windy or even spitting sleet—days when the logical thing to do might have been just to stay in camp.

The key is to acknowledge the negative conditions, analyze them and determine how to adjust your gear, hunt location and strategy to enjoy a successful trip. And another bonus you'll enjoy when hunting bad-weather gobblers is that competition from other hunters is usually light to nonexistent.

Choosing a type of *call in wet weather can take careful consideration. A diaphragm call is the obvious choice, and glass, aluminum and crystal also work well. Slate and box calls often sound squeaky and perform poorly in wet weather.*

GERALD ALMY



Rain

Rain comes in so many variations that it's hard to make a blanket statement about this kind of weather. You're likely to encounter anything from a fine mist to a steady downpour that drops several inches of precipitation in a morning. A light sprinkle won't have much impact at all on toms, unless it's particularly cold. It even has the benefit of making the woods quiet and allowing you to approach silently into optimum calling range.

Make sure you have a hat with a long brim to keep the rain off your face and your vision clear—particularly if you wear glasses. Clothing manufacturers now make rain gear that not only keeps you dry but also is quiet, so you can actually stay dry and not spook birds even in the heaviest downpour.

Choose your calls carefully, though. Diaphragms are an obvious choice. Glass, aluminum and crystal calls work well in rain, but slate and box calls often sound squeaky and perform poorly if they become wet. Keep those stashed in a pocket until the rain stops. I've used push-pin calls in the rain to lure in big toms by turning them upside down and also sheltering them with the palm of my hand.

If the rain is coming down extremely hard right at daybreak, it's often best to stay in camp or sit in your vehicle to wait for it to break or at least ease up a bit. Turkeys usually will not venture out at first light if a heavy rain is falling. If it becomes obvious later that it's not going to let up, the birds might fly down into it anyway. But if there's a chance it will break in an hour or two, they'll often simply stay put on the roost.

If the rain stops around 8 or 9 a.m., toms will often gobble heavily at that time and be anxious to find hens. Be ready in good hunting terrain the minute the rain eases up.

Walking through wet brush and dense timber and getting their feathers wet is not something turkeys enjoy, so they often head to fields if a rain is long-lasting, or if it comes after they have already flown down from the roost and begun their morning activities. During lapses in the rain or after it ends, they'll stretch out their feathers and fluff themselves

LLOYD B. HILL

***Sleet or even a** late snow in the mountains will keep turkeys on the roost, but they will often begin to move once the precipitation stops falling.*

Sleet

One of the worst situations a spring gobbler hunter can encounter is a cold sleet or freezing rain. If this is going on at first light, don't even venture out. Turkeys know this type of precipitation can rob them of their body heat, and they will stay on the roost, in conifers if available. If the sleet begins after the birds are down on the ground, they'll tend to head for evergreen thickets, where they can find some escape from the foul weather.

Unless it's predicted to last all day, don't give up. Simply be ready, waiting in your truck or in camp, and be prepared to head out as soon as the weather breaks. Focus on fields, logging roads, open mature hardwood stands near conifer groves and other places where gobblers might go to shake off the ice and moisture and fluff up their feathers.

Thunder & Lightning

Don't take chances here. Every year around 100 people are killed nationwide and thousands more are injured by lightning. No bird is worth the chance of major injury or death.

On the other hand, thunderstorms are often localized and short-lived. And far from putting a damper on turkey activity, thunder can at times actually stimulate gobbling and help you locate birds.

If possible, stay in the relative safety of your camp or vehicle while a thunderstorm is in progress, but in a position where you can listen for birds gobbling in response to the thunder. If you are caught outside when a storm erupts, move to a safe place away from tall trees but not exposed out in a field. Do not hold your gun. Put it down away from you.

Once the lightning is a safe distance away, move quickly to birds you've pinpointed gobbling to the thunder. Some of the turkeys may not gobble as often after the thunder stops, but you'll know their location and can set up and try to work them in. This tactic produced my biggest bird of the year

SCOTTY LOVETT

up to throw off the raindrops. Gobblers will strut well at this time—both to attract hens and to dry their feathers.

Even if the rain continues, turkeys will often move toward fields. A friend and I once found four toms and three hens in a field. We could see the birds gobbling but couldn't hear the sound because the rain was so heavy. Those birds stayed with their hens, but the next field we tried had three toms in it with no hens. With both of us calling, we harvested the biggest bird in that group just as the rain eased up and a ray of sun began to break through the gray clouds overhead.

Always check out fields, meadows and logging roads, particularly those near conifers, as the rain slows or even while it's coming down. Stay back in the woods as far as you can while still being able to see the field and get a clear shot if a bird comes to your call. A decoy can definitely help in this situation. If no toms are present and none answer your calls, move to another field or clearing.

GERALD ALMY

***Use the elements to** your advantage. A foggy day may allow you to move undetected, and a windy day will likely conceal most noise you might create. Depending on the weather, a box call (above) or a diaphragm call (below) may help you draw that prize gobbler in close.*

last season—a 20-pounder that gobbled often to the thunder of a nearby storm and came in to my call, along with a jake and a group of hens, after the lightning moved away.

Fog

I've heard gobblers call loudly in a thick fog, but other times it seems to have a negative influence on both their calling and willingness to come down off the roost. The birds probably realize that they won't be able to see hens very far away and that predators might approach them more easily in the mist.

If the fog is not too heavy or starts to break up, it can actually be an advantage in some ways. It dampens the woods and tends to make things quieter so you can move without making a racket. It also allows you to get closer to a gobbling bird without being detected.

Fog does make it harder to see the lay of the land, though, and get a "read" on the big picture of where the tom is and where it's likely to be heading. Another problem can be other hunters. Since fog decreases visibility, it can make it all too easy for other hunters to get dangerously close to you without your being aware of it. The potential exists for a careless hunter to see movement through the mist and think he sees a gobbler. Avoid places where other hunters are likely to be on foggy days, and focus instead on private, controlled areas where access is restricted. Be sure to wear a blaze orange vest or hat as you walk into or out of the woods and travel between hunting locations, too. Never use a gobble call in the fog, and refrain from calling as you walk.

GERALD ALMY

Wind

Strong wind is one of the most common types of bad weather a spring gobbler hunter is likely to encounter. It's also one of the most difficult to deal with.

It robs you of your ability to hear birds unless they're very close, and it reduces the ability of gobblers to hear your calls. Wind also makes turkeys, like most animals, a bit edgy and nervous. With branches and bushes rattling all around them, it's no wonder.

One strategy I've found useful is to try to move in quickly on birds that I've either roosted the night before or located early in the morning with an owl call. Sometimes winds blow all day and night, but quite often they build up a short time after sunrise. If you move in fast, perhaps closer than you normally would, and call aggressively, you may be able to work the bird in and take it before the wind becomes strong.

When you can't move in and call a bird before the wind builds, or if it's already blowing hard at first light, figure on doing plenty of walking to cover a large amount of terri-

GERALD ALMY

tory and find toms that are willing to gobble in spite of the windy conditions. Pause to call often, using loud calls such as box calls, tubes and wing bones that can be heard from long distances, as well as locators such as crow, peacock and pileated woodpecker calls. Wait longer than you normally would when using hen calls—say five minutes instead of two or three—in case a tom heard your call and is gobbling back but you can't hear it easily. If you give the bird a few minutes, it may move closer or gobble enough that you finally hear it.

Bitter Cold

Turkeys are extremely hardy, and cold really doesn't have a significant effect on gobbling and mating activity. I've called in birds on days that never left the 20s. If the weather has been mild and a strong cold front blows through, dropping temperatures sharply, it certainly can slow them up a bit in their calling. Expect some birds to come down from the roost later and perhaps gobble less. Stay in the woods longer in this case, and try calling and waiting in good locations even without a response if you've seen fresh sign. Some birds may sneak in silently on bitterly cold days.

Hot Hunting

Just as cold weather doesn't bother turkeys, neither does heat—up to a point. If the weather has been moderate or cool and an oppressive heat wave suddenly sets in, gobbling activity will likely slow until the heat wave relents. This is particularly true late in the season, when the birds are winding down anyway.

The coolest time of day—just after dawn—is the time to be in the woods in this situation. Late-morning hunting, when the temperatures start to soar, is seldom as productive. Move fast to birds you've roosted the night before or ones you've located right at dawn and work them aggressively, before they find hens and head toward a cool, shady spot.

If you can't draw a bird in early, concentrate on shaded draws, stream bottoms and ridges that are swept with cooling breezes. Sometimes ponds and streams are also attractive to the birds in these conditions, particularly if it's also been dry. If the terrain is fairly open, try a decoy near a pond or stream edge. Call lightly, since the turkeys will be heading to these areas anyway. You don't want to risk alarming them.

No, bad weather doesn't have to mean bad hunting. You simply have to adapt your tactics to accommodate the changes in turkey behavior and location that the weather causes. And when you do take a tom in extreme heat, bitter cold, wind, rain, sleet or fog, the elements that were part of the hunt will etch it vividly in your memory for years to come. ⊠

SCOTTY LOVETT

***A tom turkey displays** his tail feathers during a spring courtship ritual. During this time of the year, there is little doubt that the gobbler is the king of the woods.*

BUBBA'S Spring Guide to

Ever wonder how to handle an awkward situation on the water? Bubba Manners knows.

written by T. Edward Nickens © 2001
illustrated by Jackie Pittman © 2001

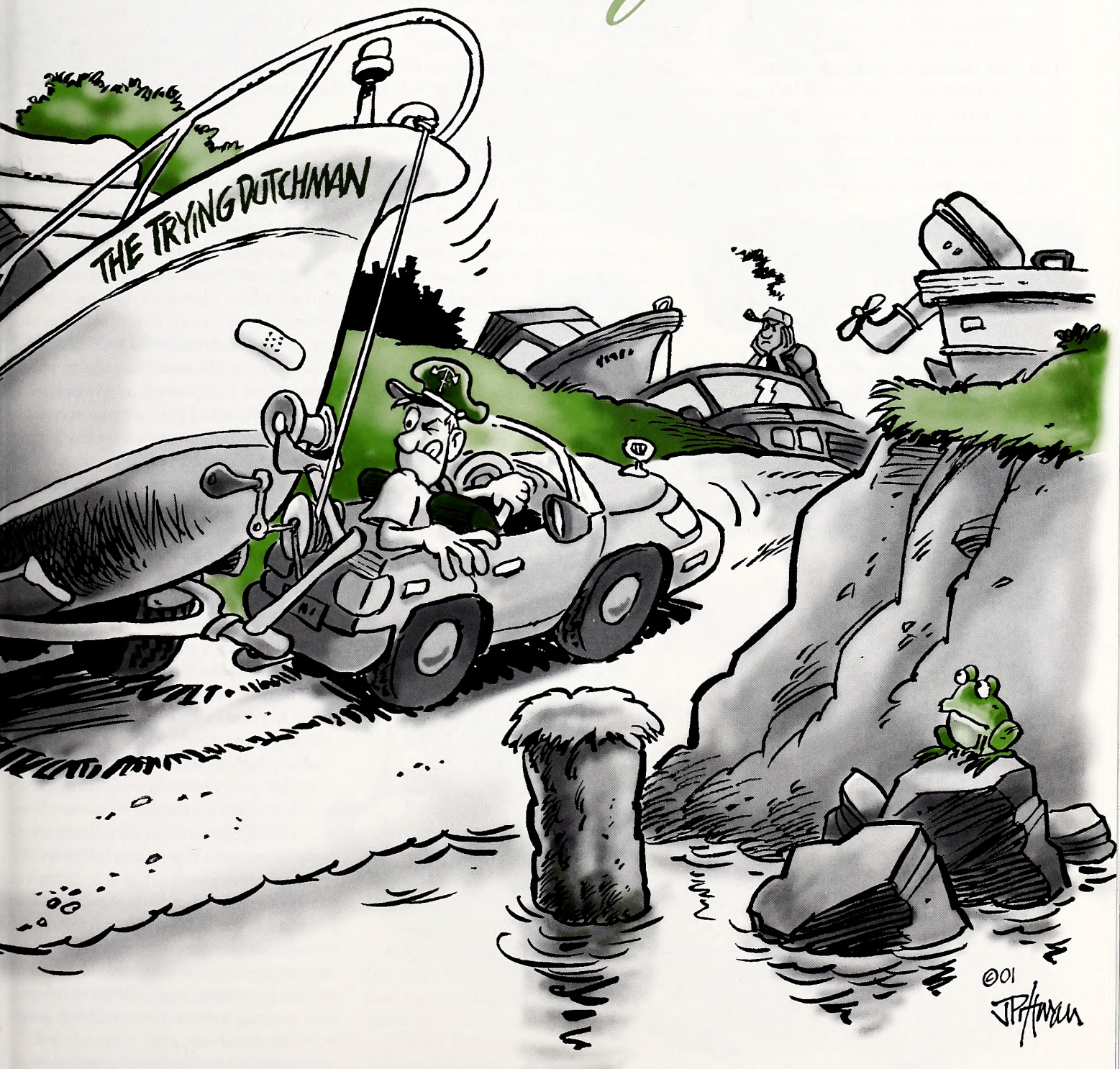
Once upon a time, outdoor etiquette was bound by tradition, handed down like a bamboo fly rod or a granddaddy's old wooden skiff. No longer. If you're new to the wilds of mountain, stream or ocean shore, you've likely found yourself in social situations more complicated than figuring out which fork to use first at Chez Snort-Snort's Café. Cast your quandaries, then, upon Bubba Manners—advice columnist for the back of beyond.

Dear Bubba Manners:

Last week I bought my first boat, so of course I had to get it into the water ASAP. Did you know boats have holes in the bottom that you have to plug up? Oh, well. Still, everyone was green with envy when they saw my fish sled: red spackle paint, 200 horses hanging off the rear—I mean transom—and enough electronics to monitor several international relief aid missions! Didn't take but four tries to get it backed into the water! Pretty good for a beginner, huh? But I did notice a few fellows glaring hard as I pulled the empty trailer up. I figured it had something to do with Mabel trying to get the mayo on the sandwiches right quick before we left the ramp. What do you think?

Signed,
Turn-the-Steering-Wheel-Right-and-the-Trailer-Goes-Left, Right?

Outdoor *Etiquette*



Dear Unplugged:

If Bubba Manners was king of the world, his first public policy initiative would be to declare those persons suffering from Boat Backing Disability Syndrome (BBDS) eligible for federal aid of some sort or another. Perhaps aid in the form of a two-by-four across the noggin. Boat ramp etiquette involves a dance of manners and morals as cryptic as any U.N. negotiating session, plus a pretty good dollop of common sense. Sounds like you could use some help.

So here's the boat ramp drill. First and foremost, before you enter that sacrosanct zone of pavement at the head of the ramps, pull your boat trailer over and out of the way to unhook restraining straps, load coolers and tackle boxes, and fuss with the battery you should have fussed with the night before. Only when all gear has been stowed on the boat—and after you and Mabel have completed the application of condiments to your various comestibles—should you get in line at the head of the ramp. Once you back the boat in the water, unleash that beast and move it out of the way. If you need to moor the boat to the ramp dock, move it well into the water so as not to block the next trailer.

Ol' B.M. knows that the pace at crowded boat ramps can be confusing for the budding boater, so just remember my simple Rule of Four Gits: Git your gear in order. Git in line. Git your boat out of the way. Git back quick after you park the truck. Diverge from this plan of action, and thou shalt suffer the slings, arrows and hurled tire lug bolts of your fellow boaters.

And one more tip, particularly about the famously crowded Roanoke River ramp at Weldon. That yellow stripe down the middle of the concrete isn't there to help you guide your boat into the water like a line of runway lights. That's a two-lane boat ramp. Hog the middle during the striper run and you will be treated to a kind of eastern North Carolina hospitality rarely discussed in Chamber of Commerce brochures.

Even I, Bubba Manners, goofed on that one once. And the big goose-egg lump on the back of my head has just about gone down now, thank you for asking.

Dear Bubba Manners:

Holy moley, the albacore action was hot out at Cape Lookout last Saturday! Fish were busting bait on the surface in acre-sized pods, so I just roared right in there, and wouldn't you know it, the fish disappeared. I just missed 'em! Lots of nice folks in nearby boats were hollering at me and pointing out the direction the fish had fled, but I knew darn well that albacore don't fly. They sure point funny down there, don't they? What gives, B.M.?

Signed,
More Money than Fish Sense

Dear More Money:

Spoken and unspoken are the rules governing the behavior of the angler casting from the cushy confines of a vessel. North Carolina's blitzkrieg action of schooling albacore and Spanish mackerel has become a justly famous phenomenon, and it's easy to be confounded as two dozen boats rooster-tail toward a pod of surface-feeding fish. But you have sinned, and sinned mightily. Here are a few suggestions that should decrease the odds of your ending up as cut bait.

Take great care in approaching feeding fish. Albacore aren't brook trout, but they can still be quite spooky. It's important not to run up on a school of fish too fast, for reasons not limited to the fact that you'll risk putting the fish down. Instead, motor upwind or up-current of the school, and drift into casting range. Or just putt-putt into position, and cut your motor. Remember to keep plenty of room between you and the next boat, at least twice the distance of a long cast.

If you're trolling for fish, mind your manners, too. Few things are more maddening than anglers who troll smack dab through the middle of surface-breaking fish while casting anglers quietly hang out on the edges of the school. There's nothing at all wrong with dragging lures, but troll along the far side of schools, away from casting fishermen.

Even more difficult to negotiate are the tricky waters—literal and metaphorical—of fishing a drift line. In the sounds and open ocean, fish will often congregate along a tidal rip or where outflowing or inflowing tides sweep past a cape or point, for example. Frequently, savvy fishermen will set up a chain of boats that drift along or through the schools of fish. Once you drift beyond the fish, you simply motor upwind or

upcurrent to the end of the line and wait your turn again. A polite "Hey, there, mind if I slip in line?" will do much to engender peace on the high seas. Anchoring your boat in the middle of this natural drift line is considered an act of maritime war.

Dear Bubba Manners:

My camping buddy and I have a little spat going. We're headed into a designated wilderness area for the first time, but we've never roughed it without Ol' Sparky, our 5-horsepower gasoline-powered generator. So here's the etiquette conundrum: If I agree to tote the boom box, isn't it fair for Earl to carry the batteries? And how much do 18 D-cell batteries weigh, you reckon?

Signed,
Symphony in S.O.B. Major

Dear Symphony:

For fear of litigation, I would never dissuade anyone from entering the rugged wilds of our vanishing backcountry without carrying all necessary means of survival. But by definition, the beauty of wilderness is the absence of man. Pumping the strains of anything from Bach to the Beatles into such woods is inappropriate. Boom boxes are chain saws to the ears! Timber skidders to the soul! The way I see it, your rights in the wilderness end whenever they affect the right of others to experience peace and quiet. Might I suggest, instead, that you peruse the selection of insect symphonies, on the aisle beyond the mountain meadow; or try something in our babbling brook department, over there just after you pass the avian operas.

My, oh, my, 'tis a fine view from up here on this soapbox! So while I'm at it, here goes: In these days of Day-Glo fleece outerwear, tent colors that look like something out of an infant's nursery, and faux tie-dyed finishes spackled on everything from mountain bikes to boot soles, wilderness travelers should rediscover the charms of OD and POK. For you whippersnappers, that's olive drab and plain ol' khaki. I don't want to see your tent pitched on the distant ridge, and I assure you, you won't see mine.

Dear Bubba Manners:

So, there we were, miles up a secluded mountain valley, when I suddenly saw a fly fisherman crouched down by a big pool. Well, we hadn't seen anybody for hours, so I hopped up on a big boulder a few yards upstream of the fellow and gave him my best "Hallooo, you catchin' anything?" What an ingrate! You'd have thought I threw hot coals in his face! So me and Bucky—that's my dog, he loves swimming in mountains streams—just headed on up the creek, minding our own business. Those yuppie fishermen sure are an unfriendly bunch.

Signed,
Spurned on the Streambank

Dear Spurned:

Now, trout fishermen are a persnickety crowd for sure, but I'll have to side with the bug-dapplers on this one. No doubt that fisherman had carefully stalked, perhaps on hands and knees, to a position below a pool full of feeding fish. Your leap atop that stream boulder probably gave him a mild heart attack, but even worse, it sent every trout in the pool streaking for cover. Wild trout are notoriously skittish, and you may not realize it, but when fish see movement on the streambank, they head for a safe haven—undercut rocks, deep under overhanging rhododendrons—and suddenly lose their appetite. The chances of their relaxing enough to feed anytime in the next few hours are slim indeed. Ditto any water that Bucky splashed through as you made your way up the valley.

I know, I know—how were you supposed to know? Good thing Bubba Manners is around, huh? If you'd like to talk to trout fishermen, try these tips for a more congenial tête-à-tête. Stand back from the stream edge until it's obvious the fisherman has quit casting to a stretch of water and is walking on ahead. But don't just sidle up behind the poor bugger and tap him on the shoulder. Fellow's probably spent the last few hours trying to figure out whether the fish are eating brown bugs with green wings and blue eyes or black bugs with no wings and high-top tennis shoes, so you're likely to create a serious cardiac condition. Just toss out a friendly salutation, stay away from the unfished water, and you may just get a few good hints on a streamside campsite nearby.

Fishermen will also thank you kindly if you'll step back from the streambank a ways on your hike to that campsite. By walking the bank, you'll be ruining the fishing for hours at a time. If you see an angler on a stream, ask him or her how far they plan to fish, so you can share the resource, and share the experience. Isn't it easy, being nice? ⊠

Wild

Animal eyes come in all shapes and sizes to meet the needs of a variety of species.

written by David S. Lee ©2001
photographed by Derrick Hamrick ©2001

We live in a visual world. We look, see, and even think in terms of shape, color, distance and motion. To enhance our visual awareness, we have invented telescopes, kaleidoscopes, binoculars, microscopes, bifocals, light bulbs and digital televisions. The sayings "Seeing is believing," "Show me," "Look at this," and "See that?" all reinforce our belief that vision dictates reality.

We assume that animals look on the world in the same way that we do. We feel for those that can't because they are handicapped, inferior, less well adapted. The truth is that a number of species have vision much more acute than ours, some see in totally different ways, and many rely on other senses, which to them are more important than vision. For my golden retrievers, smelling is believing! They can see in the present tense and simultaneously examine the world about them by keying in on scents left by sundry creatures that passed their way hours or even days before. It is a true failing of humans to think of ourselves as the standard by which all other creatures are measured against, including the way they are expected to view the world.

Different species have sight adapted for specific lifestyles, habitats and light levels. For example, our eyes are inferior at night and under water. A great horned owl does not give a hoot about seeing rainbows, and even if it could take in the same color spectrum we do, it is doubtful that the owl would be enriched by the experience. Visual needs differ; perception of light, distance and motion need not be the same for a cottontail as for a firefly. Most animals see color; some see colors we don't even know about. A number register just portions of the spectrum or shades of dark and light. And some see the world only as an impressionistic image, like one that would come off an inexpensive dot-matrix printer.

We see depth very well, but for many species the world is flat and two-dimensional. Think you know about eyes? Imagine seeing your surroundings through the eyes of some of the wild creatures that share our world.

Eyes

BULLFROG

Frogs, like all good predators, must have acute senses if they are to capture prey successfully. Their eyes are large and are positioned so that they have a good view of their surroundings, assuring that a frog can strike accurately and can also watch for potential danger. The eyes are also positioned so that they can peer above the water even when most of the frog is submerged. Once prey is captured, the bullfrog's eyes have another function: the large eyeballs can be pushed down to help fill much of the mouth cavity, forcing live prey back into the frog's throat.

Amphibians, such as the bullfrog, were the first animals to produce tears, a simple means of maintaining an aquatic environment around the eye. Besides preventing the eyes from drying out, tears also contain antibacterial and fungicidal agents to prevent infection.

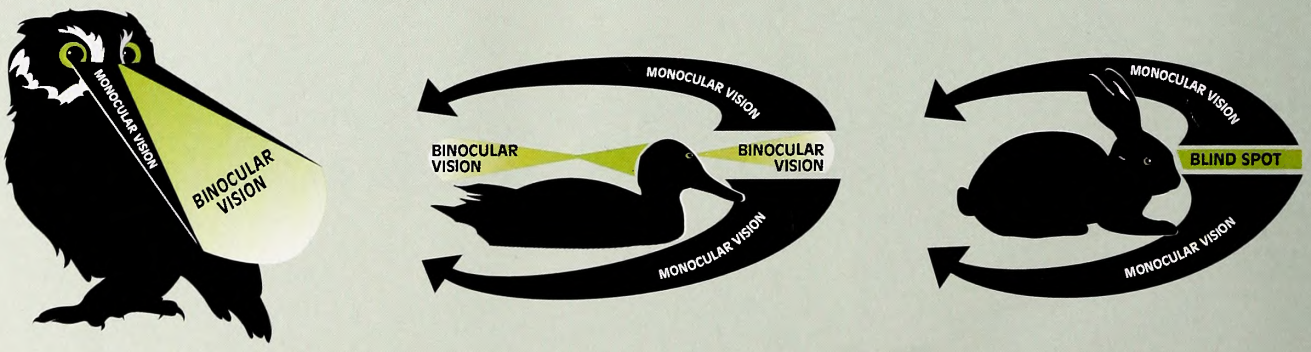
SCREECH OWL

Superb eyesight is critical for most animals that fly, and no other living organism can match a bird's visual abilities. An owl has visual powers that are about eight times more acute than ours. In addition, because of their nocturnal behavior, the owl has eyes that are structured to take in any available light. Their lenses are not set in flattened eyeballs as are those of most birds, but in deep tubes.

With their eyes facing forward on a relatively flat face, owls have a wider range of binocular vision than do other birds. Binocular vision is achieved in the zone where the two monocular fields of vision overlap and form a single image. In most owls this is about 70 percent of their total field of vision. Good binocular vision is critical for owls and other raptors to pinpoint prey.

GRAPHIC BY MARSHA TILLETT

EYES FOR DIFFERENT VIEWS



The placement of an animal's eyes is critical to its survival. Different views allow some animals to spot prey and others to detect predators.

With both eyes facing forward on a flat face, owls have a wider range of binocular vision than any other bird. Binocular vision is vital to raptors to judge distances to catch fast-moving prey.

With its eyes set more to the sides of its head, the duck has some limited binocular vision for judging distances and finding food, but it can also see 360 degrees around to watch for potential predators.

With its eyes set to the extreme sides of its head, the rabbit lacks binocular vision and has a blind spot directly in front, but it can spot nearly any approaching predatory.

NORTHERN SHOVELER

Ducks, such as the northern shoveler, have eyes set far to the sides of the head and positioned somewhat high. Because of this, ducks can see a full 360 degrees and simultaneously watch much of the sky. Ducks also have some degree of binocular vision in both the extreme forward and rear fields of view. Their feeding habits make specialized binocular vision unimportant, but the limited amount they do have is useful for judging distances of potential predators coming from either direction.

Many ducks also have a clear, lenslike window in their nictitating membrane that is highly refractive, allowing them to see well under water.

EASTERN COTTONTAIL

Rabbits have a constant panoramic view of their world, nearly a full 360-degree field of view, to help them spot predators. Their eyes sit so far to the sides of their heads that rabbits have a blind spot directly in front of them. Although they can see all around without moving their heads, rabbits have little depth perception. The rabbit's vision does not discriminate forms easily, but the animal can judge changes in size and distance very well. Thus, an approaching dog or hawk will not go unnoticed.

In a repeated theme, Nature has given prey species wide angles of vision that greatly enhance their day-to-day survival. In contrast, most predators have highly focused binocular vision and limited peripheral views.

COPPERHEAD

Among North American snakes, the vertical pupil distinguishes most poisonous snakes from the round-pupil nonvenomous species. Vertical pupils are characteristic of primarily nocturnal animals that also like to move about in sunlight. The slitlike opening is more efficient to open and close than a circular one. This system also gives better protection to retinas that are basically adapted for low light levels. The same basic design is shared by a number of other creatures including cats.

Pit vipers, such as copperheads, also have an infrared system, allowing them to sense prey and predators based on temperature differences. The combination of infrared and normal vision gives these snakes an incredible advantage. They have two independent, overlapping visual systems, improving the overall picture in the same way that we use both sound and sight to locate and study an object. Unlike lizards and other reptiles, all snakes lack eyelids. A snake's eyes are protected by the same scalelike outer skin that covers its body.

PRAYING MANTIS

The praying mantis, like other insects, cannot close its eyes. Its vision is poor compared to ours and is sharp and focused for only a few feet, at most. The eye does not move, and the focus is fixed.

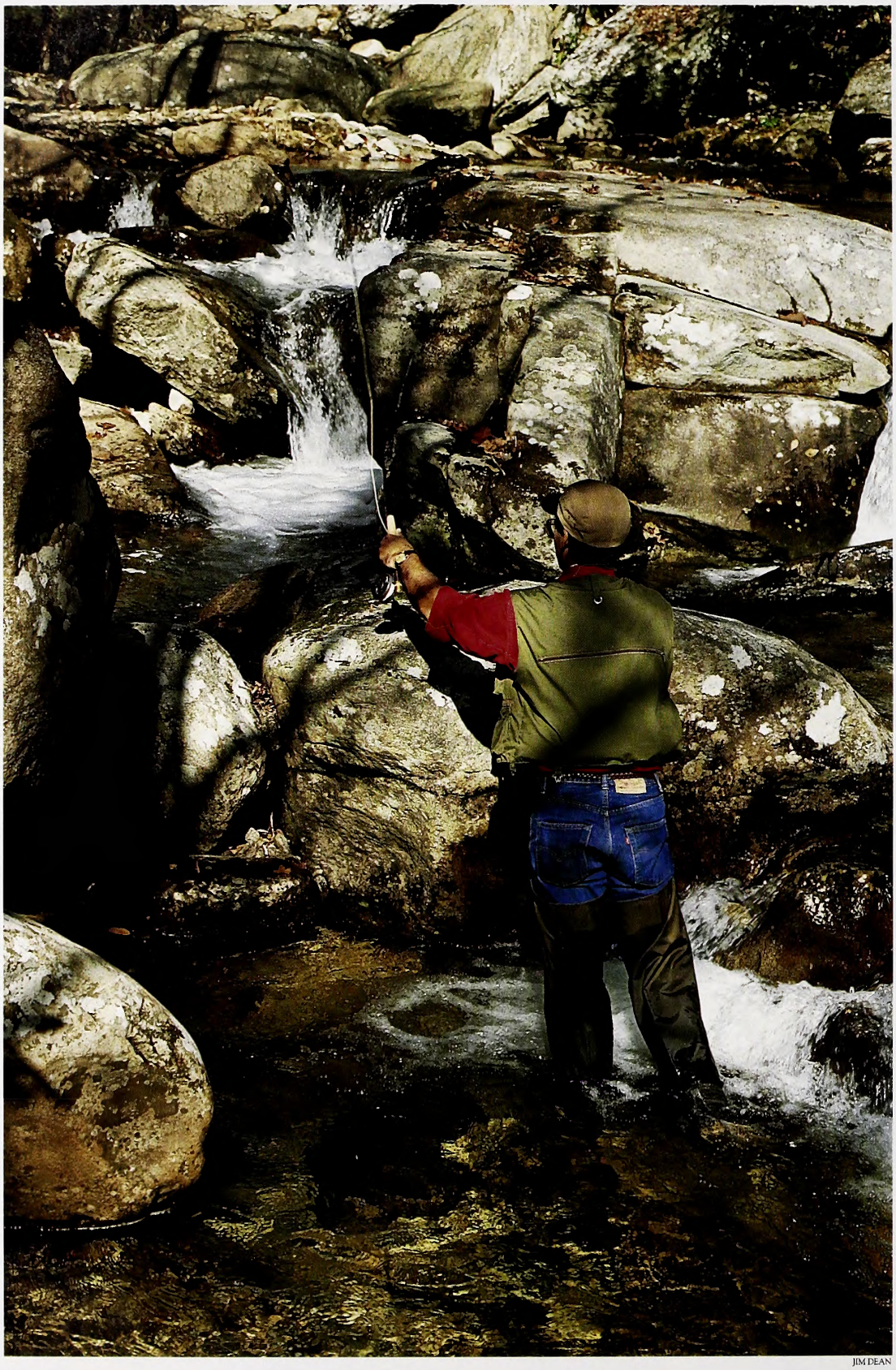
Compared to human eyes, mantis eyes have less than 1/100 the acuteness. However, compound eyes are exceptionally suited for seeing movement, as images move across one after another of the individual screens.

Insect eyes are made up of numerous six-sided facets. These may number as many as 28,000 in a single eye of some dragonflies. Each facet is a miniature, self-contained visual system with its own tiny lens, light-transmitting system, sensitive retinal cells and nerve ending. No two facets are aimed in exactly the same direction, and a single facet registers a miniature impression that is a fraction of the total scene. No one knows what picture actually forms in an insect's brain, but the facets work in combination to somehow build an image from the views of many tiny eyes.

WOLF SPIDER

Spiders have simple eyes, in contrast to the compound eyes of many other invertebrates. Many spiders, such as the wolf spider, have eight eyes. The smaller eyes on the sides of a spider's head are for peripheral vision, and they detect motion but not images. Spider eyes lack lenses, so they cannot shift from near to far vision. Thus, depending on an object's distance, spiders must back up or move closer to get a clear view. There is a wide variation in the quality of vision among spiders.

Hunting spiders—such as the wolf spider—must find, stalk and capture prey; so they have much keener vision than do those spiders that wait for their food to become trapped in webs. Some cave-dwelling species are blind.



JIM DEAN

Fishing Tiny Waters

JIM DEAN

■ ■ ■

Why would otherwise sane fly fishermen intentionally choose to fish minuscule, headwater streams for small trout?

written by Jim Dean © 2001

My first experiences fly-fishing for trout in the Southern Appalachians were disconcerting, to say the least. The whole notion of fly-fishing for trout was new to me those 40-odd years ago, and what little I knew about the sport was gleaned mostly from books written by famous anglers who had cut their teeth fishing English chalk streams or the fabled streams of the Catskills and New England.

I remember thinking, "This is not the way those books describe it." There were no wide rivers with huge, gliding pools; no elegant streams winding gently through pastoral meadows. There were no Orvis-coordinated fishermen angling into the twilight; no clouds of hatching mayflies; no trout dimpling the surface; nary a picturesque covered bridge.

Instead, what I found in western North Carolina were small, staircased freestone streams tumbling clear and cold through jungles of overhanging hemlock, rhododendron and impenetrable thickets of alders and catbrier. On the smallest of these waters, a big pool would be no bigger than a horse trough, and a long cast—if you could cast at all—might carry a whopping 20 feet. There were no clouds of hatching insects—unless two or three mayflies constituted a cloud—and I hardly ever saw a rise, much less a trout unless it was already running for cover. It didn't help that the streams always seemed to lie at least 2 miles down a trail that would kill a mountain goat. Something was clearly amiss.

What was mostly amiss was me—by at least 500 miles. I had made the common novice mistake of assuming that trout streams, and the trout that inhabit them, would be pretty much the same everywhere. For a year or so, I tried to apply the tactics I'd read about to our Southern Appalachian streams. I tied flies to match patterns of aquatic insects (despite never having actually seen those particular species on the water). I waited (in vain) for blizzard hatches. I fished far and fine and paid for it with hopeless tangles. I fished slowly, thinking that I could unlock the secrets of a pool by spending hours on it. Finally, I began to meet local fishermen who knew better.

One of them was A.J. Johnson, a longtime trout fisherman from Winston-Salem who was then in his 60s. Johnson had fished for trout all over the country, and he had long since learned that trout in Southern Appalachian streams play by different rules.

"Forget that traditional stuff," Johnson advised. "Very little of it applies down here. I promise you that Theodore Gordon, Francis Halford, G.E.M. Skues, Lee Wulff and all those other guys would have swapped their rods for golf clubs if they'd had to fish a single day on our frustrating little streams," he said. "I'll show you what works here.

"And if you still can't catch our trout," he added, unable to resist teasing me, "maybe you ought to pack your books and move where trout can read."

What began as an act of mercy on Johnson's part developed into a friendship that lasted until he died a few years ago at the age of 88. Like all highly skilled and versatile anglers, Johnson relied on his years of experience and keen powers of observation to judge

***It takes some effort** to fish North Carolina's tiny, headwater streams, but the rewards are plenty. Solitude, wild fish and the chance at an occasional larger trout are just some of the dividends.*

JOEL ARRINGTON

***A stealthy approach** and short casts are necessary to successfully fish small headwater streams and pools. With little extra water to hide in, headwater trout —including native brookies—can be extremely wary.*

what would and wouldn't work, and some of the tactics he taught me seemed highly unorthodox. Yet, looking back, I believe his greatest gift was a lasting appreciation for the unique challenge of fishing these small streams. Oddly, it is the smallest of these streams—the tiny headwaters, minuscule even by Southern Appalachian standards—that now appeal to me most.

Johnson especially loved to hike far above the larger main stems of our bigger streams and seek out the pristine rivulets and spring branches that were once considered much too small for fly-fishing. From him, I learned the charm of fishing these tiny waters, and it's not just a matter of avoiding the growing crowds on bigger, more popular streams. Headwater trout are almost always wild, and though most measure 8 inches or less, it is not uncommon to find bigger rainbows and browns. Some of these remote headwaters also hold native brookies.

Learning to fish such water demands great patience, but the frustration factor has been reduced by the development of modern tackle that is better suited for these tightly canopied creeks.

The most obvious piece of equipment is a short fly rod, but not all short rods are ideal. Older anglers may recall that short rods 4½- to 6½-feet long became all the rage in the 1960s. Eddie Shenk popularized their use on Pennsylvania's limestone streams, and Lee Wulff used them to catch salmon. They seemed perfect for tiny streams, but it soon became apparent that the ultra-shorties had some drawbacks. They were so short that you couldn't keep line from catching in the current and quickly dragging the fly, and they were hateful to fish with a leader longer than the rod. I once owned a 5-foot glass fly rod and a handsome 6-foot Orvis Superfine, and I still have a 6-foot Fen Flea, but their shortcomings (pardon the pun) proved especially worrisome on small, overgrown streams, where you'd expect their length to be an asset.

That seems to have been the conclusion of many short-rod enthusiasts, because modern graphite rods are now seldom shorter than 6½ feet. Indeed, most experienced fishermen consider 7- or 7½-foot rods the shortest truly practical length, even on the smallest streams.

Such rods are made to balance with a variety of 1-weight to 6-weight lines, but the lighter-weight lines are not as well suited to small streams as you might think. Often, you will be on your knees casting parallel to the water, or roll-casting up a narrow tunnel of rhododendron. Rods built for 1- to 3-weight lines often lack the power to make those short, fast, tight-looped casts, especially with the bushy-type dry flies or tandem fly combinations that work so well in these waters. Perhaps I just haven't found the right combination, but all of the light-line short rods I've fished seem to require more room for careful backcasts—exactly opposite from the conditions you find on most small streams.

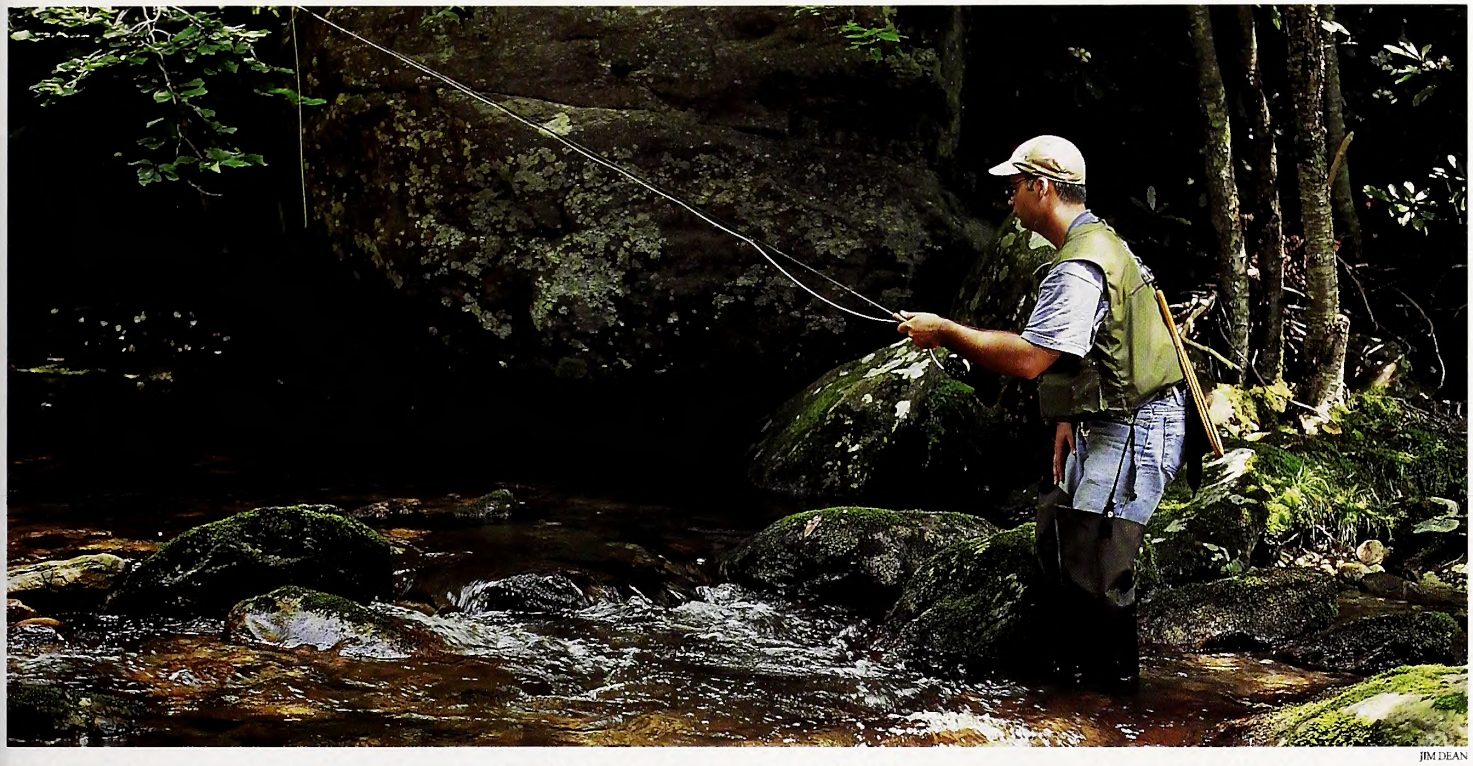
■ ■ ■

My favorite tiny-stream rod is a 7½-foot graphite that balances with a 4-weight line, and I've got an older 5-weight I like just as well. I've had some 7 footers that work just fine, but those 7½-foot rods don't seem to be a handicap in close quarters, and they are better choices for those days when I combine fishing a tiny headwater with an hour or two fishing a larger stretch of water.

A long leader is an abomination to use in tight quarters, and unnecessary, too. A 7½-foot leader is easy to control and plenty long enough to keep from spooking trout. You don't need fine tippets, and I seldom go lighter than 5X in even the clearest water. The wild trout in these waters are not particularly leader shy, and you're far more likely to spook trout by letting them see you, making a sloppy cast or allowing your fly to drag. Save those long leaders and 7X and 8X tippets for diminutive flies and tailrace trout.

Trout in these tiny streams are very spooky, but they aren't very selective because these streams are typically poor in nutrients, and there's not an abundance of food. Trout seldom see big hatches of aquatic insects, so

JOEL ARRINGTON



JIM DEAN

Learning to fish *tight spots in rough terrain with overhanging trees and rhododendron are just some of the challenges that await fly anglers on North Carolina's tiny mountain streams.*

they have little opportunity to "lock" in on a specific insect. Instead, they feed opportunistically, grabbing everything that looks remotely like food. Forty years ago, I observed that these trout would eat anything you could get near enough to feed them, and I haven't found any reason to change that opinion.

Though it would probably give Theodore Gordon heart palpitations to hear it, you could probably fish every Southern Appalachian tiny headwater the rest of your life with one fly pattern—okay, maybe three or four. Because these trout will almost always rise aggressively to any dry fly, it pays to pick a sizable pattern that's buoyant and easy for you to keep track of on these typically swift currents (you can't properly fish any fly you can't see). Hairwings or Wulff-type flies are ideal choices, and I seldom recall a time when any other pattern would outfish a size No. 14 or 16 Wulff Royal (though Johnson occasionally switched to a Blonde Wulff in late summer). More recently, some anglers have opted for various elk-hair caddis patterns because they're also visible and float well.

Johnson also frequently fished a tandem fly combination with a Wulff trailed on a short leader by a sinking fly (he called it a dropper). He would tie a Wulff on his tippet, then tie a second tippet into the eye of the Wulff alongside the first knot (some fishermen prefer to tie the second tippet to the bend of the dry fly's hook). On the end of this second trailing tippet, Johnson would tie a black, hard-bodied sinking ant. You probably won't need a trailing tippet longer than about 8 to 12 inches in headwater streams. Trout, especially wild browns, love that sinking ant, but you might sometimes find it an advantage to substitute a more modern bead-head, pheasant-tail nymph or similar pattern. The dry fly helps you keep track of the sinking fly, but you'll catch trout on both.

Tandems can be more difficult to fish in the tight confines of headwaters, but it's nice to have the option to add an ant or bead-head nymph on those occasions when the trout seem to be feeding beneath the surface. Even so, chances are that you'll do well fishing with just a dry fly most days.

■ ■ ■

Though skilled fishermen may quibble about choice of tackle or flies, no one is likely to disagree about the wariness of trout in these tiny Southern Appalachian headwaters. These fish will scoot to their hiding places if they even suspect you're anywhere near. Successful anglers avoid detection by staying out of the water as much as possible—wading creates waves that spook fish. Fish staircased pools from the downstream side, staying low and hiding behind rocks and brush. Crawl into position if necessary. Make short casts, and fish the water nearest you first.

You may find that you catch more trout in chutes, runs and pockets where the currents help hide you than you do in the bigger pools. In pools, fish the eddies just beyond tongues of white water with a short line (fish are less apt to see you through the white water). To avoid tangles in overhanging trees and rhododendron, cast with your rod parallel to the water. Learn to roll-cast, and use a bow-and-arrow cast to fish the tightest spots.

Don't dawdle. Make a few careful casts to each likely spot, then move on. If you don't catch a fish pretty quickly, chances are you've already spooked the trout. Experienced small-stream anglers often cover several miles of water in a day.

Alas, all this care can go for naught if you're not the first person to fish a particular stretch of water on any given day. Fishing behind anyone is a recipe for failure, so learn to look for fresh footprints, and go elsewhere if you suspect someone is ahead of you.

One more thing. Tell someone where you're going and when you expect to be back. You'll be in rough country, miles from other fishermen (you hope), and that's no place to break an ankle and realize that no one has the slightest clue where you are.

Besides, you're going to have so much fun you'll want someone to find you so you can come back another day. ⊠

25 days to Flight

Using a rigged camera and a cavity nest cut from a section of a tree, the photographer documents a nesting family of northern flickers—from hatching to flight.

written by Chris Powell | photographed by Bill Duyck ©2001

day 1

day 4

nine lives

Northern flickers are considered prolific egg layers and have been known to lay as many as 17 at a time. They usually nest in natural cavities, with laying taking place from early April to mid-May.

day 6

day 11

family matters

Too soon to have grown feathers, the nine young flickers sleep in a pile to keep each other warm on a chilly spring night. When a parent returns to the nest, the young compete for the right to be the first fed. To feed each nestling, the parent regurgitates a meal of insects into the mouth of a waiting chick.

Adult flickers do not have the super-hammering apparatus of most woodpeckers. This means they can't drill into hard wood. Thus, they need rotten or soft trees for nest-holes and feed mostly on the ground, frequently dining on ants.

Long-term surveys indicate this species' numbers are declining, particularly those of the eastern race (also known as the yellow-shafted flicker).

day 13

day 15

day 16

day 25

ready for liftoff

The adult flicker takes particular care to keep a clean nest, removing all fecal matter. Within about 20 days, the babies have developed wing feathers and are close to being able to fly. On the 25th day, the juveniles prepare to leave the nest by testing out their wings and flying up to the nest hole. Once fully grown, the new flickers will inhabit a wide variety of habitats including open woods, groves and suburbs.

Here's a critter that won't win any beauty contests. It won't get prizes for intelligence. But it sure knows how to make its way in the world. It's our

All-American Marsupial

written and illustrated by Consie Powell ©2001
nature activity by Anne M. Runyon ©2001

A UNIQUE NORTH AMERICAN MAMMAL

The Virginia or common opossum (*Didelphis virginiana*), one of a variety of opossums found in the Western Hemisphere, is an opportunistic **generalist**. It has agile feet and a **prehensile** tail to help it climb and grasp as it searches high and low for food. A mouth well stocked with 50 teeth (compared with a dog's 42 or a cat's 30 teeth) enables an opossum to eat a wide variety of foods. Foraging mostly at night, opossums meander across some 50 acres, snooping for insects, grubs, frogs and salamanders; invertebrates such as snails, crayfish and worms; nuts, fruit or carrion. They are good swimmers and are seldom found far from water. These are habits common to other North American mammals. But the Virginia opossum is distinctly different from all other North American mammals in its **marsupial** mode of development.

The first, and so far only, fossil land mammal found in Antarctica is an extinct opossum.

Opossum hind feet look like hands with a thumb, and work just as well.

front foot

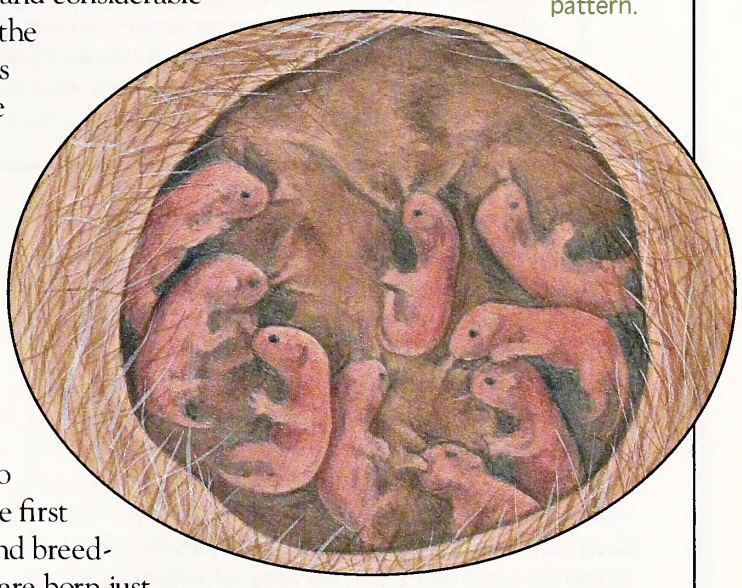
hind foot

The name "opossum" was adapted from a native American name for this marsupial. Australian "possums" take their name from our opossum; the 'O' is dropped in spelling as well as in speech.

THE LONG AND SHORT OF GROWTH AND DEVELOPMENT

In mammals, after an **ovum** has been fertilized by a **sperm**, nourishment of offspring can follow either of two major pathways. **Placental** or **eutherian** (yoo-THEER-ee-an) mammals (including humans) undergo significant development and considerable growth inside the mother's **uterus**. Nourishment is provided to the developing embryo by means of a **placenta**, in which membranes surrounding the embryo make close contact with the wall of the uterus. In contrast, a marsupial embryo spends only a very short time in the mother's uterus and is born very undeveloped. It makes its way to a teat, attaches for a long period of time, and receives its major nourishment for development and growth from **lactation**. Eutherians have a long period of **gestation** and a short period of lactation; marsupials have a very short period of gestation and a very long period of lactation.

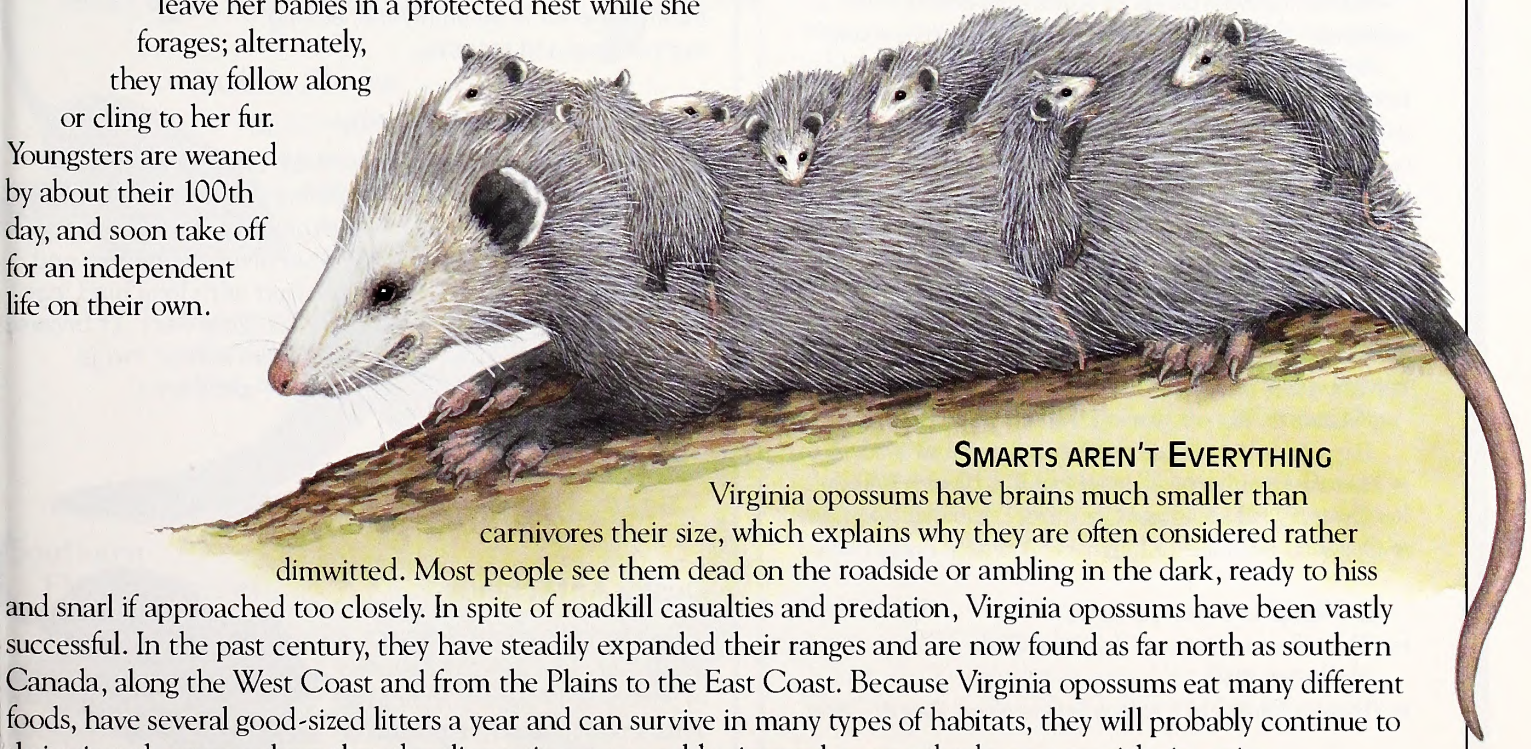
An opossum's stretchable pouch has muscles that can pull it closed. Inside are 13 teats in a horseshoe pattern.



OPOSSUM YOUNGSTERS

Virginia opossums are solitary animals and intermingle only to breed. They usually produce two litters a year; the first breeding takes place in January, and a second breeding occurs in June. Honeybee sized babies are born just 13 days after conception. They are blind, naked and very undeveloped, except for the front feet, which are strong enough to pull a newborn from the birth canal to its mother's pouch. Once in the pouch, the baby opossum grasps a teat and stays inextricably attached for several weeks.

When they are 80 to 90 days old, young opossums first leave the pouch. The mother may then leave her babies in a protected nest while she forages; alternately, they may follow along or cling to her fur. Youngsters are weaned by about their 100th day, and soon take off for an independent life on their own.



SMARTS AREN'T EVERYTHING

Virginia opossums have brains much smaller than carnivores their size, which explains why they are often considered rather dimwitted. Most people see them dead on the roadside or ambling in the dark, ready to hiss and snarl if approached too closely. In spite of roadkill casualties and predation, Virginia opossums have been vastly successful. In the past century, they have steadily expanded their ranges and are now found as far north as southern Canada, along the West Coast and from the Plains to the East Coast. Because Virginia opossums eat many different foods, have several good-sized litters a year and can survive in many types of habitats, they will probably continue to thrive just about anywhere that the climate is not too cold—in rural areas, suburbs or even right in a city.

ANCIENT MARSUPIALS

The ancient ancestors of today's marsupial and eutherian mammals, which evolved from a common ancestor, became distinct from one another some 100 million years ago. At that time, what are today's continents were positioned differently on the earth. Scientists believe the earliest marsupials evolved on what is now North America while the earliest eutherians evolved on what is now Eurasia. Over millions of years, during which time land masses moved, marsupials colonized a united landmass, which we now know as South America, Antarctica and Australia. The marsupials evolved and diversified extensively, filling various niches. For some 60 million years the landmass, called Gondwanaland, remained isolated from North America and supported many species of marsupials, including some large carnivorous marsupials.

What Does It Mean?

generalist: an animal that does not have a lifestyle involving highly specialized strategies—for example, feeding on a variety of foods that may require different foraging techniques
prehensile: capable of grasping
marsupial: a group of mammals that are characteristically very undeveloped at birth and depend heavily on lactation for nutrition; many of them have pouches
ovum: the reproductive cells produced by a female
sperm: the reproductive cells produced by a male
uterus: the organ of a female mammal for containing and nourishing the young during development before birth
placenta: the organ in certain mammals that unites the embryo to the uterus and helps the nourishment of the developing young
placental: referring to the structure that connects the fetus and the mother's uterus for growth and development
eutherian: referring to mammals whose embryonic young are nourished by a placenta
lactation: the secretion of milk from mammary glands
gestation: the period of development within the uterus
carnivorous: eating a diet consisting of animal material
omnivorous: eating a varied diet including both animal and plant material

Read and Find Out

- *The Encyclopedia of Mammals* edited by David MacDonald, Facts on File Inc., 1984.
- *Mammals of the Carolinas, Virginia, and Maryland* by William D. Webster, James F. Parnell and Walter C. Biggs, Jr., University of North Carolina Press, 1985.
- *Meet the Opossum* by Leonard Lee Rue III with William Owen, Dodd Mead and Co., 1983.
- *Opossums* by Emilie U. Lepthien, Childrens Press, 1994.

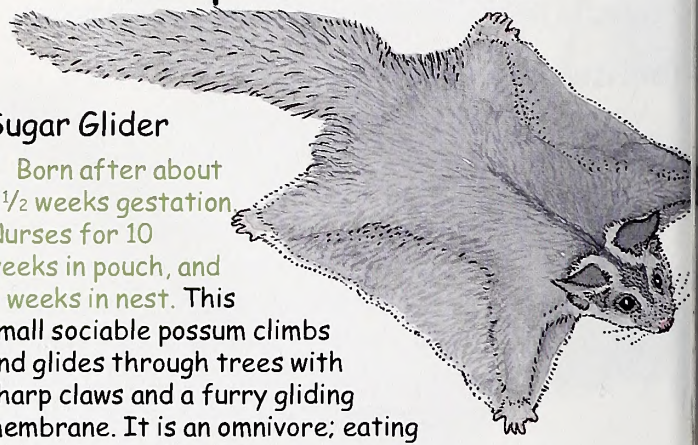
In *Wildlife in North Carolina:*

- "The Ultimate Survivor" by Doug Elliott, November 1980.
- "Possum Times" by Carolyn Sellers Askar, August 1986.

Editing and design by Consie Powell

Compare and Contrast . . . .

Marsupials In Australia:



Sugar Glider

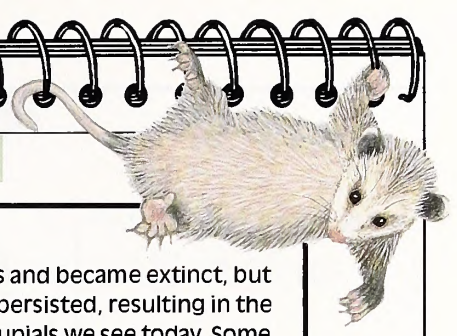
Born after about 2½ weeks gestation. Nurses for 10 weeks in pouch, and 5 weeks in nest. This small sociable possum climbs and glides through trees with sharp claws and a furry gliding membrane. It is an omnivore; eating nectar, sap and insects.

Swamp Wallaby

Born after about 1 month gestation. Nurses for 9 months in pouch and 6 months on ground. This large herbivore leaps far and fast with long hind legs and big feet. It browses on leaves, twigs and ferns.

Dusky Antechinus

Born after about 4 weeks gestation. Nurses for 8 weeks in pouch and 4 weeks in nest. This small inquisitive predator jitters along the ground, digs and pounces with short powerful legs and long claws. It hunts for worms, snails and insects with a long snout and sharp teeth.



About 15 to 20 million years ago, scientists believe marsupials that evolved in what is now North America became extinct, probably out-competed for food and habitat by eutherian mammals that had colonized across land bridges from Eurasia. Then some 2 to 5 million years ago, when the land bridge between North and South America appeared, many eutherian mammals, including some large carnivores, reached South America. The large, carnivorous marsupials were out-competed by eutherians and became extinct, but the small **omnivorous** marsupials persisted, resulting in the 81 species of South American marsupials we see today. Some 11 species of marsupials moved north to colonize Central and North America. The only one to make it as far north as the United States was the adaptable Virginia opossum.

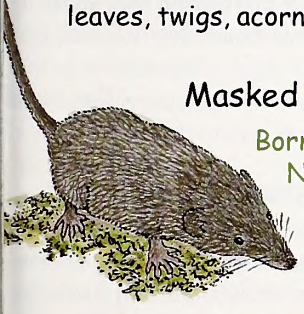
Different Beginnings and Similar Lives

Eutherians In North America:

White-tailed Deer

Born after about 7 months gestation. Nurses for 8 months on the ground. This large herbivore runs fast and bounds through the bushes on long legs and hoofed feet. It browses on leaves, twigs, acorns and crops.

Masked Shrew



Born after about 3 weeks gestation. Nurses for 3 weeks in nest. This tiny, fierce predator scurries across the forest floor, digs and pounces with short legs and clawed toes. It hunts for insects, worms, slugs and mice with a long flexible snout and sharp teeth. It is active day and night, and is always hungry!

Southern Flying Squirrel

Born after about 6 weeks gestation. Nurses for 8 weeks in nest. This small, sociable rodent climbs and glides through the trees with sharp claws and a furry gliding membrane. It is an omnivore, eating nuts, berries, seeds, buds, insects, bird eggs and carrion.

Get Outside

Look for Opossum Sign: If you live near a stream or pond, there are probably opossums in your neck of the woods and you can watch for their tracks. Even muddy places on dirt roads are worth a look. Opossums have very distinctive tracks: look for a print that looks a lot like a hand print with a thumb pointing out or even a little bit down and away from the fingers. Is some critter eating goodies from your peach or persimmon tree? It's probably an opossum.

Learn About Other Marsupials: Visit the North Carolina Zoo in Asheboro to see some other marsupials. Can you see any distinctive features that distinguish them from more familiar eutherians? What do they eat? How do they move? What North Carolina eutherian mammal do you think compares to each marsupial that you view?

Pay Attention to Gestation and Lactation: Do you know of a dog or cat, or even a pet rodent like a mouse or guinea pig, that is expecting babies? Find out about when the babies were conceived, then keep track of the time that passes until they are born. Once the babies are born, keep track of how long the babies nurse before they start to eat other food besides mother's milk. How do those times compare?

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Who Fits Here?: teaches students to understand how each ecosystem has characteristic life forms adapted to live there.

Tracks: teaches students to identify common animal tracks.

Changing Attitudes: teaches students to recognize change in attitudes related to wild animals or the environment, and to describe factors influencing changes in attitudes.

Learning to Look, Learning to See: teaches students to describe differences in an environment resulting from casual and detailed observation.

Get WILD

Advanced WILD Workshops:

June 18-19 – *Fish Identification*, New River State Park, West Jefferson. Call (828) 262-3185 for more information.

Elk Return to Great Smoky Mountains

KEN WILSON

Welcome back! *Elk race to their new home inside an acclimation pen located near Cataloochee Valley in the Great Smoky Mountains National Park. A total of 75 elk will be released during a three-year period.*

More than 100 years since their disappearance, elk are once again a part of North Carolina's mountains.

About 800 people watched as 25 elk were released into an acclimation pen on Feb. 2 near Cataloochee Valley in the Great Smoky Mountains National Park. An additional 50 elk will be released in the area during the next two years.

"It is our mandate to restore species to the park that have been lost, particularly those species that have been lost due to man's actions such as overharvest or land use that results in loss of habitat," said Kim Delozier, a National Park Service biologist who has been supervising the project.

The subspecies being released in the Smoky Mountains is the Manitoban elk. It is considered a close relative of the now-extinct Eastern elk, which was extirpated from North Carolina around the late 1700s because of overharvest and loss of habitat from logging.

The released elk originated from Elk Island National Park, located in Alberta, Canada. In 1996 the Tennessee Valley Authority acquired 29 of the animals and moved them to Land Between the Lakes, a national recreation area in western Kentucky. From there they were transported to North Carolina.

—Chris Powell

Edited by Chris Powell

Registration Opens for Fur, Fish 'N Game Camps

Registration is now open for boys and girls ages 12-15 who wish to participate in the 2001 Fur, Fish 'N Game Camps to be held June 10-15.

The Fur, Fish 'N Game Camps are designed to give participants a better understanding of our natural resources and how we interact with them. First-time participants will attend the regular camp, earn a Hunter Education Certification, study wildlife and aquatic biology, learn about firearm safety and be involved in numerous recreational activities. Children who've already participated in a Fur, Fish 'N Game Camp will qualify for the Advanced Camp.

Advanced campers will take a more hands-on role in learning about prescribed burning, wildlife surveys, estimating timber value, dendrology, animal damage control and endangered species management. The regular camp will be limited to 85 campers, and the advanced camp will be limited to 20 campers. Both camps will be held at the Millstone 4-H Center, located adjacent to the Sandhills Game Land in Richmond County.

Accredited by the American Camping Association, the Millstone 4-H Center provides trained camp counselors while class instruction is handled by a variety of professional natural resource managers. The registration fee is $280 per camper, and registration forms can be obtained by calling (919) 515-3244, faxing (919) 515-7812, e-mailing terry_patterson @ncsu.edu or by contacting your local county Cooperative Extension Service center. Send registration form and fee to N.C. 4-H Camps, Box 7606, NCSU, Raleigh, N.C. 27695-7606.

—Courtesy of the N.C. State University Forestry Extension Department

Wild Turkey Populations Continue Upward

Another record turkey harvest is predicted for North Carolina, as a result of several years of good nesting success and the recent opening of five new hunting areas.

The new areas open to hunting are in the northwestern portion of Franklin County, in the central part of Moore County, the western portion of Randolph County, the southwestern portion of Wayne County and on the portion of the Shearon Harris Game Land located in western Wake County. These five counties are now open in their entirety.

Due to high interest from hunters, the newly opened portion of Shearon Harris Game Land will be placed in the Commission's permit-hunt system, said Mike Seamster, the Wildlife Commission's turkey project leader. Instead of general admission, the permit system allows hunters to apply for hunts, and a computer randomly selects a predetermined number of parties.

"We're concerned about extremely high hunter numbers on some of these areas creating unsafe hunting conditions and greatly detracting from the hunts," Seamster said. "We felt we could best handle both by putting the land into the permit system. If a hunter is drawn, he will get a high-quality, three-day hunt and will stand a good chance of harvesting a bird."

LEONARD LEE RUE III

***New areas in five** North Carolina counties will be open to turkey hunting this season.*

A total of 6,827 turkeys were harvested last year, which was a new state record. North Carolina has set state records for total turkey harvests 15 of the last 17 years. Seamster said that the success is likely a combination of new hunting areas opening as well as a rapidly growing turkey population.

Results from the most recent turkey brood survey indicate that 2000 was a good year for nesting success. In order to gauge wild turkey productivity, surveys are mailed statewide to 1,200 public and private participants. A total of 11,599 wild turkeys were observed during the summer 2000 brood survey. Statewide, 71 percent of the hens were with poults (juvenile turkeys), which indicates good nesting success. Also, an average of 4.3 poults accompanied the broods, and the average number of poults per hen was three. Wild turkey productivity varied only slightly between the western, central and eastern portions of the state.

"We consider three poults per hen to be good productivity," Seamster said. "If you can average three poults per hen you are going to see turkeys increasing across the state. We've had good productivity for the past three years," he added. "There should be a number of jakes that will be 2-years-old this year, which are the birds that start doing a lot of gobbling."

—*Chris Powell*

Field Notes

- Hatchery-Supported Trout Waters – Open April 7
- Wild Trout Waters – Year-Round
- Wild Turkey – April 14 Through May 12 (bearded birds only)

Information on bag limits and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

NORTH CAROLINA Wildlife RESOURCES COMMISSION

Got a Gobbler?

Call 1-800-I-GOT-ONE
to report a turkey harvest.

**All bearded birds harvested during the 2001 turkey season must be reported either through a cooperator agent or via the toll-free telephone reporting system.*

Striped Bass Season Opens on Roanoke River

Following several years of striped bass harvest increases, the Wildlife Commission has decided to hold the line on this year's quota.

Beginning March 13, stripers may be harvested on Tuesdays, Wednesdays, Saturdays and Sundays until the season closes by proclamation when 112,500 pounds of the fish are caught. The quota covers the Roanoke River Management Area, which includes the Roanoke, Cashie, Eastmost and Middle rivers as well as their tributaries.

Pete Kornegay, the Wildlife Commission's coastal region fishery coordinator, said the overall health of the Roanoke River striped bass fishery allowed last year's quota to be increased from a previous 69,700 pounds to 112,500 pounds. That quota, Kornegay said, gives anglers a decent harvest level, without hurting the fishery.

"We're beginning to see the Albemarle Sound/Roanoke River striper population level off now after the tremendous expansion of the 1990s," Kornegay said. "Holding the striper harvest at current levels should ensure a healthy population for some time."

As in previous years, anglers can keep three fish per day on the open fishing days, with a minimum size limit of 18 inches. From April 1 until the season closes, no stripers between 22 and 27 inches may be retained on the Roanoke River.

Also, a regulation to reduce hooking injury to stripers will remain in effect this year. Only single, barbless hooks can be used from April 1 to June 30 in the waters of the Roanoke River upstream of U.S. 258. This legal requirement can also be met by crimping down the barb of each hook with pliers.

Though the spring striper season on the Roanoke River will be closed when the quota is met, catch-and-release fishing remains a viable option through June. Because so many spawning fish will be caught, it is important that all stripers be handled gently and released quickly. Fishermen should avoid touching the fish with towels or dry hands. Protecting the fish's slime layer will go a long way toward reducing disease or death.

—Chris Powell

On Patrol

Editor's note: *The situation below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

Enforcement Officer Charles Merritt was working the Waccamaw River in Brunswick County when he came across two men in a boat fishing for bream. One man, who suspiciously had a pole next to him, stated that he was just along for the ride, because he was from another state and didn't have a North Carolina fishing license. He didn't do his buddy a favor, though. After careful counting of the fish, the total number exceeded the daily creel limit that "one" fisherman was allowed. Ticket time.

Study Reveals Circle Hooks Better for Stripers

A recent study conducted by the Wildlife Commission's Fisheries Division indicates that circular hooks have far less incidents of deep-hooking striped bass than the traditional J-hooks.

To determine which hook styles are the least harmful when catch-and-release fishing, biologists caught a total of 300 stripers on different-sized circle hooks and J-hooks.

"What we found is that using 4/0 and 5/0 circle hooks markedly reduced instances of deep-hooking," said Robert Hand, a fisheries biologist. "However, we also discovered that larger-sized circle hooks such as 7/0 as well as offset circle hooks (those with points bent slightly outward) actually deep-hooked as many fish as the J-hooks. So it's not only using circle hooks, but using the right size and kind."

JOEL ARRINGTON

To encourage anglers to use appropriate circle hooks when fishing for stripers, fisheries biologists will be handing out samples of hooks at various boat ramps during the 2001 spring striper season. The hooks were donated by Wright and McGill Co.—manufacturer of Eagle Claw hooks. In addition, postcards will be handed out allowing anglers to provide feedback.

The biologists also discovered that they were able to achieve more successful hookups if they cranked the reel rather than pulling the rod back to set the hook. "If you try to set the hook it will jerk the hook out of the fish's mouth," Hand said. "It needs to be pulled through the fish's mouth. You let the fish run with the bait, and you pick up the rod and start reeling. Just remember this saying: 'Crank, don't yank.'"

—Chris Powell

International Migratory Bird Day Events

International Migratory Bird Day is held each spring on the second Saturday in May to help celebrate the return of millions of migratory songbirds from tropical wintering areas. Events and bird counts that are held throughout the springtime help to create awareness of the importance of migratory birds throughout the Americas. For more information about migratory birds and IMBD events in North Carolina, visit the Partners in Flight web site at www.faculty.ncwc.edu/mbrooks/pif/index.html.

International Migratory Bird Day events in North Carolina:

April 28

- Blue Jay Point County Park, Wake County, all day, (919) 870-4330
- Howell Woods Environmental Learning Center, Johnston County, Warbler Watch, 7:30 a.m. to 6 p.m., all ages, (919) 938-0115

May 5

- San-Lee Park, Lee County, Birding Celebration program, all ages, (919) 776-6221

May 19

- Cradle of Forestry in America Historic Site, Migratory Bird Celebration, 9 a.m. to 5 p.m., Pisgah National Forest, all ages, (828) 877-3130

May 12

- Reedy Creek Nature Preserve, Birds for Kids program, 10 a.m. to noon, (ages 7-13) preregistration is required
- Cowan's Ford Wildlife Refuge Bird Hike, 7 to 9 a.m., (ages 7 and up) preregistration is required
- McAlpine Creek Greenway Bird Hike (ages 7 and up) preregistration is required

For more information on each of the above three programs, call (704) 598-8857.

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

April 22

The Pisgah Center for Wildlife Education will hold a HOP-IN: Cedar Rock Falls Aquatic Expedition from 1 to 3 p.m. HOP-IN (Happening Outdoor Programs Involving Nature) is a program series for teenagers, ages 14 to 18. Each program focuses on a different outdoor activity that engages the participant with the natural world. For more information, call (828) 877-4423.

April 25

The Pisgah Center for Wildlife Education will hold a WILD Geology program from 9 a.m. to 2 p.m. A multi-media presentation will be given by geologists Sarah and Richard McKeever on the local geology of the Mt. Pisgah, John Rock, Brevard area that produced mountains, valleys and faults. Bring a lunch, drink and sturdy shoes. Weather permitting, attendees will take a wildflower-geology hike up the John Rock. The moderate climb is for ages 10 and up. For more information, call (828) 877-4423.

April 28-29

The N.C. Herpetological Society will hold its annual spring meeting 8:30 a.m. at the N.C. Aquarium in Manteo. All persons interested in reptiles or amphibians are welcome to attend. For more information, call (919) 733-7450 Ext. 561 or Ext. 754.

Anglers Can Get Recognition for Their Catch

Now in its fifth year, the N.C. Angler Recognition Program (NCARP) is continuing to recognize anglers who catch fish reaching minimum standards established by the Inland Fisheries Division of the N.C. Wildlife Resources Commission.

Based on the honor system, fishermen simply measure the fish or weigh it on a pair of hand scales. If the fish is a trophy, it can be kept or released. Anglers who land qualifying fish can receive a colorful certificate, which includes the details of their catch and an artist's illustration of the particular species.

Bob Curry, program manager for the Fisheries Division, said that besides recognizing significant catches, the program also provides biologists with additional data on specific game fish species.

"Since the program started, the Division of Inland Fisheries has issued 1,292 certificates and 35 Master Angler citations," Curry said. "This information enables our biologists to track catches of quality-sized fish and monitor trends in fisheries populations."

The Angler Recognition Program shouldn't be confused with the State Record Fish Program, which certifies the largest fish caught in the state. This program requires more stringent guidelines including the use of certified scales and witnesses.

To apply for an NCARP certificate, use the appropriate form on page 29 of the current *Regulations Digest* or the fishing section on the Wildlife Commission's Web site www.ncwildlife.org. Don't forget to send in $5 for processing.

NCARP

NORTH CAROLINA ANGLER RECOGNITION PROGRAM

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through December 2000

Principal Balance
$31,296,385.13

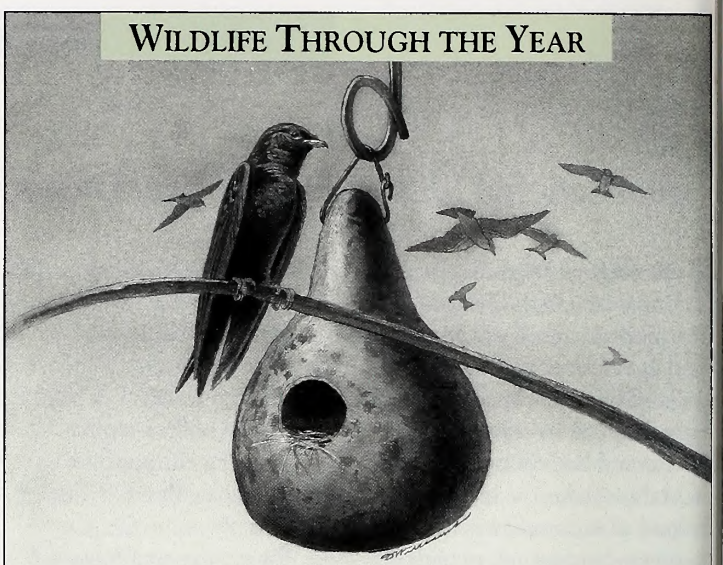
Interest Earned
$32,524,337.08

Total Receipts
$63,820,722.21

Interest Used
$20,436,178.04

Fund Balance
$43,384,544.17

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax-deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Coffee Talk

by Rodney Foushee

With International Migratory Bird Day just around the corner, now is a good time to think about one of the more serious threats to migratory songbirds. Coffee?

Yes, coffee. That's the theme of this year's celebration. (Check page 35 for more details on local events surrounding International Migratory Bird Day.) New methods for growing the beans used to make one of our favorite morning beverages are threatening dozens of bird species including tanagers, orioles and warblers that spend the winter in Latin America and other southern locales and then make the long flight back to North Carolina to breed.

On traditional coffee plantations, coffee plants are grown under a canopy of trees, which provides shelter and food for many wild birds. In many parts of the Caribbean and Latin America, these shade-grown coffee farms are the only forest habitat left. But due to an increased demand for coffee worldwide, many traditional plantations have been converted to high-yield, sun-tolerant coffee plantations, which lack trees. Studies have shown that the diversity of birds and other wildlife quickly plummets when the plantations are converted from shade to sun-tolerant coffee species.

Sun-grown coffee has other negatives besides the destruction of the forests including requiring more fertilization and increased soil erosion and runoff. And the effects are being felt here as fewer migratory songbirds are returning each spring.

What can be done to reverse this trend? Take the time to learn more about the coffee issue and tell others about what you've learned. And by all means, buy shade-grown coffee and encourage others to do the same. Bird-friendly, shade-grown coffees are becoming more readily available at local stores and restaurants than ever before. If they aren't at your favorite places, take the time to ask why.

Here's hoping you think about the birds the next time you reach for a cup of joe.

N.C. WILD STORE

NEW!

The latest poster in our Amphibian series with the N.C. Herpetological Society

SALAMANDERS *Part 1*

Hidden along streams, in caves and under vegetation, more than 50 different species of salamanders carry out their unique life cycles in North Carolina. This first poster of a three-part set on North Carolina's salamanders features the 13 species in six families that have lungs or gills. Habitat and life cycle notes accompany a color photograph for each species. This captivating educational poster for school or home fits 24" x 36" stock frames. (The other two posters in this set will be available later this year.)

$6 ITEM CODE **P19**

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

Waterfowl Decoys of North Carolina ▲

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34".

$10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians ▲

Sixteen traditional trout flies are presented in stunning color detail. Each picture is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34".

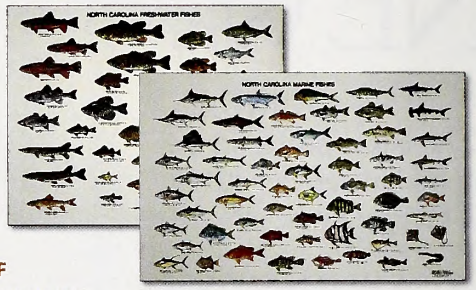
$10 ITEM CODE **P13**

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds

This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. Third in the "Sporting Heritage" series. 22" x 34".

$10 ITEM CODE **P18**



▶ Fishes of North Carolina

Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").

$10 ITEM CODE **P9**

Butterflies Poster Set ▲

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set. Guide also sold separately.

$2 ITEM CODE **M5**

Amphibians: Frogs of North Carolina Poster Set ▶

Set of two posters in full color: The Hylid Frogs & True Frogs and Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom. 22" x 34".

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

◀ Reptiles of North Carolina

Set of 4 posters in full color.

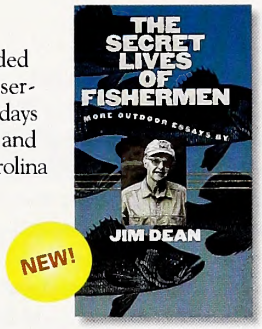
Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

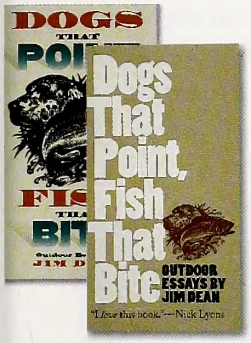
$18 ITEM CODE **P10**

The Secret Lives of Fishermen ▶

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound.

$24.95 ITEM CODE **M13**





◀ Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.

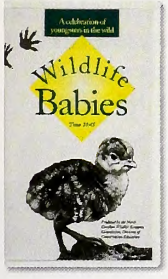
Hardbound $19.95 ITEM CODE **M8**

Paperback $10.95 ITEM CODE **M12**

All Things Are Connected ▶

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.

$22 ITEM CODE **W3**



◀ Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.

$20 ITEM CODE **N9**

Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.

$2 ITEM CODE **M6**

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.

$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each

Cub & Boy Scout Correlation ITEM CODE **E9**

Girl Scout Correlation ITEM CODE **E10**

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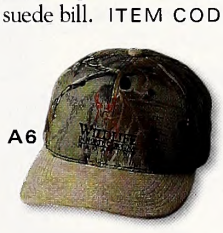
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

A11

A3



A6

A7

A1

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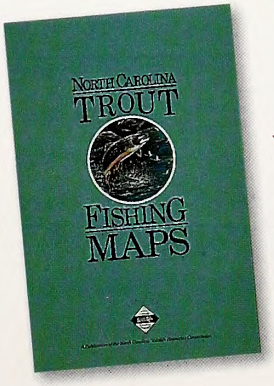
A10



◀ North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.

$12 ITEM CODE **TMAP**

◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

2000 Migratory Waterfowl Print and Stamp Set ▶

This limited edition print signed by artist Ron Louque depicts the grace and color of canvasbacks in flight at North Carolina's historic Whalehead Club. Your purchase will support the Wildlife Commission's efforts to manage wetlands and restore waterfowl populations. Overall size is 12" x 14"; image size 6 1/2" x 9". ***This item is not subject to 15% discount.***

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North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

Explore the diversity of the state's natural communities in an 82-page soft-cover book written by naturalists and journalists. This guide describes 13 habitats across the state with captivating illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a North Carolina WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

$16 ITEM CODE **E6**

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From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

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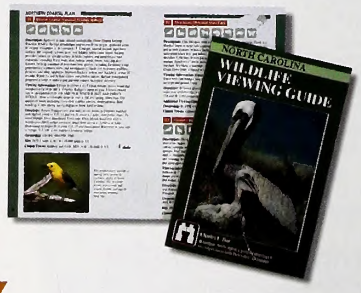

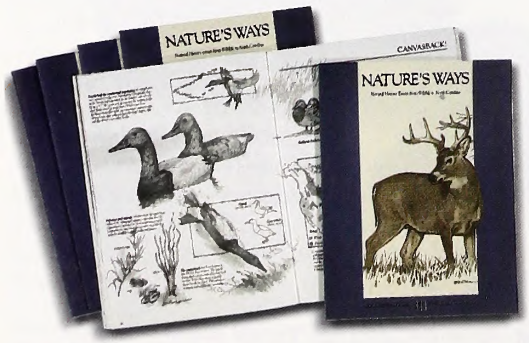

Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

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N.C. WILDLIFE Profiles Binder & N.C. WILDLIFE Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

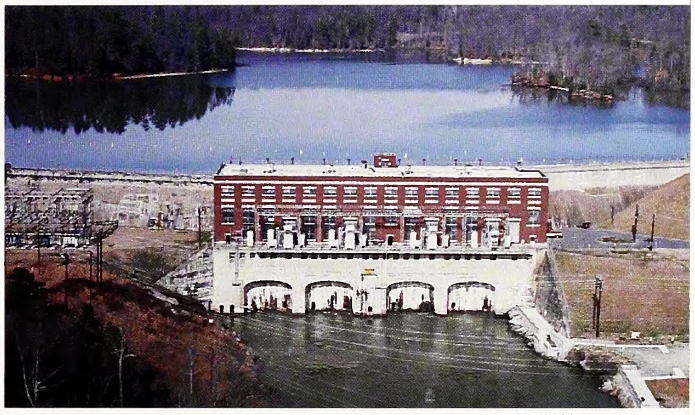
- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**

WILDLIFE COMMISSION SPOTLIGHT

Window of Opportunity

Production of electricity was one of the primary reasons that most large and many small dams were built in North Carolina. Electricity is produced when water from a reservoir is released through turbines located in the dam. Between 2001 and 2008, the N.C. Wildlife Resources Commission will be involved in the relicensing process of at least 14 hydroelectric power projects across the state.



CHRIS GOUDREAU

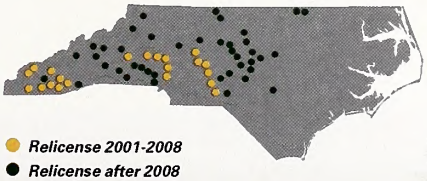
Because these licenses are good for 30 to 50 years, the Wildlife Resources Commission is working hard to ensure that wildlife and environmental issues are addressed before the new licenses are approved. The Federal Energy Regulatory Commission (FERC) approves each license, which must balance energy production with fish, wildlife, water quality, recreation and other public uses. These projects encompass 31 reservoirs mostly within the Yadkin, Catawba and Little Tennessee river basins.

The FERC must consider input from state and federal resource agencies and the public. The Wildlife Resources Commission aims to minimize the negative impacts, and increase the benefits, of dams on the fish and wildlife resources of North Carolina.

The fisheries and wildlife-related issues being considered are water quality, reservoir water-level fluctuation, stream flows, fish loss, fish passage, shoreline management and recreation.

The Wildlife Resources Commission is a very active participant in the relicensing process. Many new hydroelectric licenses have requirements that provide better protection of fish and wildlife.

FERC Regulated Hydro Dams in North Carolina



As part of a relicensing process, the Mountain Island Powerhouse Dam, located on the Catawba River (above), is scheduled to be reviewed by the Wildlife Commission.

STEPHANIE GOUDREAU

The Eyes Have It

Different shapes and designs of eyes can tell a lot about how animals, such as the great horned owl, interact with their surroundings. For more on animal eyes, see page 14.

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WILDLIFE IN NORTH CAROLINA

MAY 2001 $1.50

N.C. DOCUMENTS
CLEARINGHOUSE
MAY 2 2001

Special Issue

THE SANDHILLS

What Happened to Bass Bugging?

by Jim Dean ©2001

This past winter, I spent several days sorting and filing many color slides I'd taken years ago. Among them were photos from trips I'd made to Currituck Sound during the late 1960s and early '70s. At that time, Currituck was justifiably renowned for its brackish-water largemouth bass fishing. Lodges and guides catered to anglers, especially fly fishermen, who came to fish what was called the "world's biggest bass pond." When the wind and weather cooperated, the fishing could be astonishingly good.

One photo, which was taken on my first trip there with friends from Burlington in 1968, shows me kneeling on a dock surrounded by dozens of bass weighing 2 to 5 pounds. That represented one day's legal catch for several fishermen. Nowadays, bass fishermen practice catch-and-release but, apart from the photo's political incorrectness, it reminded me of the most incredible fly-fishing I've ever experienced. In three days, we caught more than 200 bass on bass bugs, releasing most and keeping only our daily limits to eat.

JIM DEAN

Matt Hodgson

The 40-mile-long sound was capable of absorbing such catches back then, partly because the peak fishing occurred mostly in May and June. Currituck's bass fishing remained extraordinary until increased water salinity in the 1980s affected the sound's ability to support freshwater species. Salinity has dropped in recent years and some bass have returned, but most experts doubt the fishery will ever equal its heyday.

Those memories raise another issue, however. With fly-fishing's popularity at an all-time high nowadays, one might expect that bass bugging would have more advocates than ever. After all, the fly rod was the bass fisherman's primary tool until the arrival of spinning and modern free-spool casting tackle shortly after World War II. Besides, saltwater fly-fishing is huge business these days, and fishermen use the long rods for nearly everything that swims.

Yet we're still awaiting bass bugging's oft-predicted renaissance. Jim Butler, editor of *Fly Rod & Reel*, finds it puzzling. "Our surveys show that 84 percent of our readers regularly fish for trout, but bass fly-fishing comes in second at about 33 percent, well ahead of saltwater, stripers and all the rest," he says. Even so, sales of bass fly rods and bugs lag far behind, and there's no great demand for publications to increase coverage of bass bugging.

Matt Hodgson, former director of The University of North Carolina Press, is a serious bass bugging enthusiast and a knowledgeable historian of bass bug lore. He and I fly-fish for bass regularly, and we've swapped theories trying to understand bass bugging's apparent lack of sex appeal.

"With fly-fishing's popularity at an all-time high nowadays, one might expect that bass bugging would have more advocates than ever."

One theory is that modern bass fishermen concentrate their efforts on large impoundments where the fly rod is at a disadvantage compared to spinning and bait-casting tackle. Bass may also be the choice of many fishermen only when other, more glamorous species aren't immediately available. There is also some evidence that bass fly fishermen are older on average and content to fish with gear they've had for years. "Part of it could be that construction of quality, innovative bass bugs has always been a costly hand operation, and that limits commercial production," Matt says. "I also suspect many rod manufacturers, anticipating poor sales, simply haven't bothered to design fly rods specifically to cast bass bugs, and would-be enthusiasts become discouraged trying to cast big, wind-resistant offerings with inappropriate rods."

It's certainly true that there aren't a lot of fly rods ideally suited for bass bugging. In 1998, a group of us tested more than three dozen 8½- to 9-foot, 8- and 9-weight rods from the best-known fly rod manufacturers. Though we specified that we were testing rods suited for bass bugging, many of the rods sent to us were actually designed for saltwater use where stiff butts and super-fast tip actions are desirable. Most of these rods proved far too fast to comfortably handle bulky bugs—some were so stiff that the bug felt like a coonskin cap tethered to a pool cue until you furiously worked out enough line (40 or 50 feet) to load the rod. Conversely, some of the other so-called bass rods collapsed like wet noodles.

We concluded that relatively few manufacturers offered rods suitable for bass bugging. Indeed, the best bass rods we tested had either moderate or somewhat slower, yet still powerful actions that extended well down the rod. Some of these were superb, but it was clear that it's vital to test any rod using the lines, leaders and, especially, the bugs you plan to fish with before making a purchase.

You might want to keep that in mind if you decide to pursue bass with a fly rod. If enough fishermen find the right tools and learn how much fun they're missing, we might still experience that long overdue renaissance.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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The Cane Connection

written by Clyde E. Sorenson ©2001
illustrated by David Williams

Though nonnative bamboos have been planted here for hundreds of years, North Carolina has but one native bamboo species. *Arundinaria gigantea*, or cane, is a remarkable native giant grass that many wildlife species depend on.

Cane is found throughout the state in many diverse habitats. In the Mountains and the Piedmont it is most associated with rich bottomlands and stream banks. Since it is well adapted to fire, it becomes the dominant plant species in frequently burned drainages in the Sandhills pinelands. On the Coastal Plain, it forms into large stands, called canebrakes, spanning many acres in the upper reaches of swamps and in the big river valleys. Cane often figures prominently in the understory of the forests of the region. On rich, well-watered soils in healthy, long-established colonies, cane has reached more than 40 feet in height, although most modern stands attain only six to ten feet.

Our cane, like most bamboo, reproduces almost entirely by vegetative means. New stalks emerge from underground rhizomes at roughly 20-inch intervals. Shoots grow rapidly for one growing season, and then, although they don't get any taller, live for another 10 to 15 years. New rhizomes, and new canes, radiate from established stalks, and rhizomes can grow as much as 20 feet a season.

The sexual reproduction of cane, like that of most bamboo, is not well understood. Intervals as long as 50 years may separate bouts of seed set; all the colonies over a large region may flower, set seed and die simultaneously. This reproductive strategy floods an area with an unpredictable pool of more seed than seed predators can eat, enhancing the chances that some seed will germinate. The small proportion of viable seed germinates almost immediately. Most seedling plants start life under the dying stalks of their parents, since the seed generally don't disperse well.

Wildlife species value cane for a number of reasons. The foliage is quite nutritious, and since the plant is a long-lived perennial, the leaves are a very reliable food source. Cane is the sole host plant for the caterpillars of at least six species of butterflies, including the pearly eyes and several of the tiny, exquisitely patterned roadside skippers. Another caterpillar (this one the larva of a moth) makes communal nests in the foliage by tying several leaves together with silk, and many other species of insects also feed on cane or the rich litter that accumulates under it. Three hundred years ago, cane was one of the preferred forages for the bison that used to roam the Southeast (and modern cattle still find it extremely attractive). The new shoots are nutrient-rich and were once an important food source for Native Americans.

Cane foliage is dense and evergreen, and it provides excellent cover for a variety of wildlife species throughout the year. At least three species of wood warblers—the beautiful hooded, the elusive Swainson's and the virtually extinct Bachman's—are very closely associated with canebrakes during the breeding season. The dense canopy, but relatively clear floor, in a cane thicket makes for almost perfect wintering habitat for American woodcock. The timberdoodles can probe for earthworms in the thick leaf litter of the brake secure from attack by aerial predators. Swamp rabbits, or cane-cutters, are also closely associated with canebrakes; they feed on the young shoots as well as use the cane for refuge. Both bears and white-tailed deer occasionally use canebrakes for feeding and bedding sites. Perhaps the most famous denizens of cane thickets are the lowland timber rattlesnakes we call canebrake rattlers. These increasingly rare reptiles seek the small rodents that abound in the cane thickets.

Cane rarely reaches the impressive heights it once did, and some of the species associated with it are declining, because of alterations we have made to the landscape. Cane thrives best in areas with rich soil, abundant sunlight, and disturbance about every 10 years. It can't tolerate heavy grazing by livestock, annual burning, or frequent mowing. Cane can also be shaded out or greatly reduced by hardwoods following the complete suppression of fire. The conversion of bottomlands to farmland and pine plantations has also reduced the presence of this valuable plant in the landscape. Once a canebrake is gone, another is not likely to replace it, and the wildlife dependent on it will also disappear.

Clyde E. Sorenson is an assistant professor of entomology at North Carolina State University.

Other Reading:

- David Farrelly, *The Book of Bamboo* (Sierra Club Books, 1984).
- E. J. Judziewicz (editor), *American Bamboos* (Smithsonian Institution Press, 1999).

Surfing the Web

- For a brief description of bamboo, *Address:* http://www.lewisbamboo.com/gigantea.html
- For illustrations of plant parts, *Address:* http://www.csdl.tamu.edu/FLORA/image/k4389200.htm
- For a review of the ecology of cane, *Address:* http://www.fs.fed.us/database/feis/plants/graminoid/arugig/

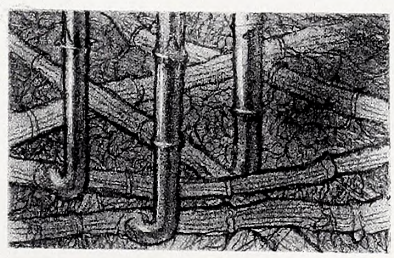
The caterpillars of at least *six species of North Carolina butterflies rely on cane for food. The adults of these species are rarely found far from it.*

Lace-winged roadside skipper

Creole Pearly eye

Southern Pearly eye

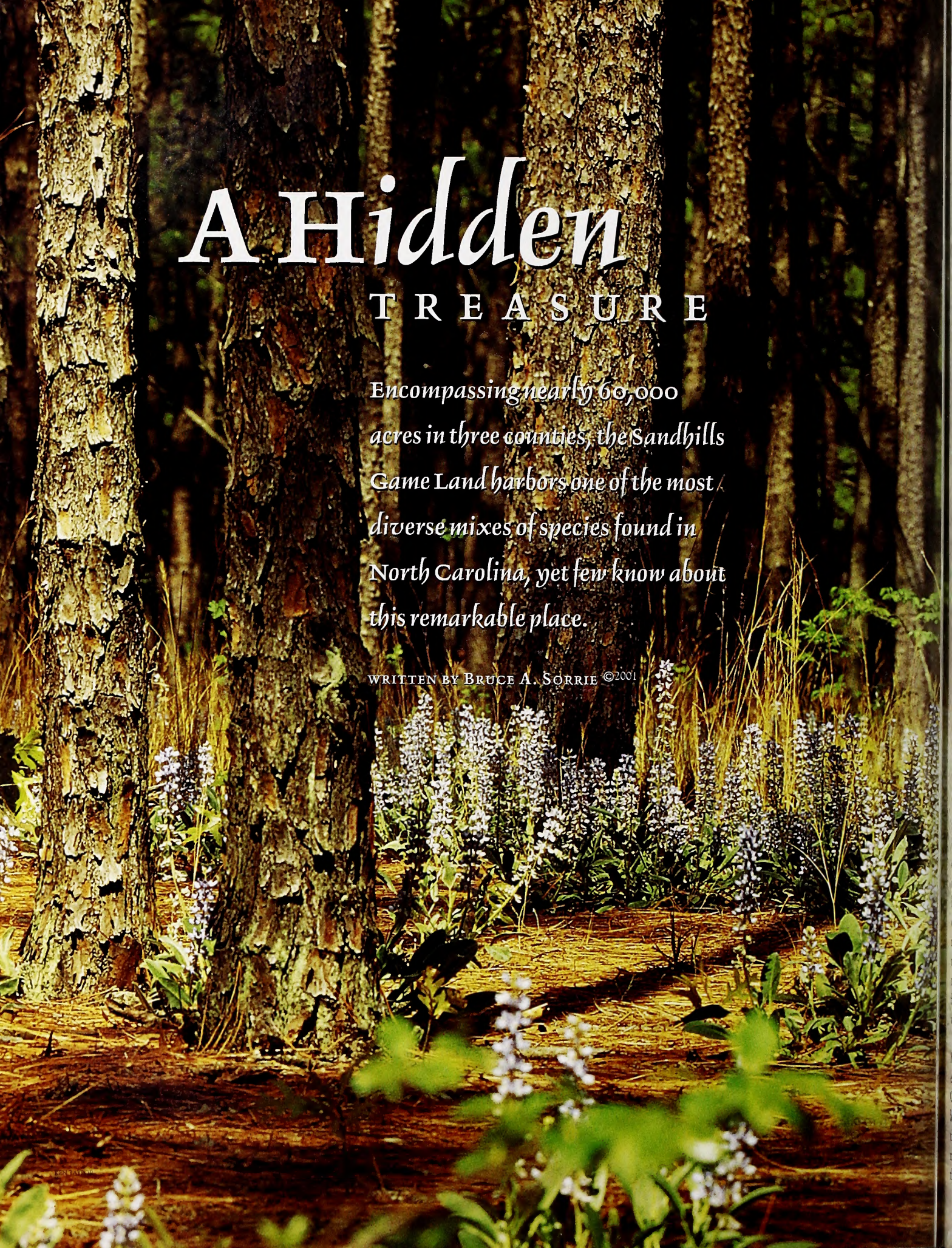
Several songbirds, *including the elusive Swainson's warbler, forage, roost and nest in and around canebrakes.*



The thick, interwoven *underground stems (rhizomes) of cane resemble a cargo net binding the soil. Because of the large energy reserves stored in the rhizomes, a canebrake rapidly recovers from a fire. Predators such as the canebrake rattlesnake hunt rodents among the dense stalks.*

The Sandhills

Sandwiched between the southern Piedmont and the Coastal Plain, the Sandhills mark the farthest advance of the ocean some 2 million years ago. The sandy remnants of ancient dunes account for the uniqueness of this region and also for its barren appearance. But looks can be deceiving. On closer examination, the Sandhills harbor a rich diversity of wildlife and plants — some of which are found nowhere else. Let's take a closer look at this natural gem.



A Hidden TREASURE

Encompassing nearly 60,000 acres in three counties, the Sandhills Game Land harbors one of the most diverse mixes of species found in North Carolina, yet few know about this remarkable place.

WRITTEN BY BRUCE A. SORRIE ©2001

GRAPHIC BY VICTORIA CUMBEE

FROM DRY SANDY RIDGES TO WET STREAM BOTTOMS, THE SANDHILLS GAME LAND SUPPORTS A DAZZLING DIVERSITY OF HABITATS AND SPECIES. BRILLIANT LUPINES (FACING PAGE) BLOOM IN THE SPRING IN THE SHADOWS OF LONGLEAF PINES. FAR FROM OFF LIMITS, THE GAME LAND IS MANAGED FOR MANY USES INCLUDING HUNTING, HORSEBACK RIDING AND BIRD DOG FIELD TRIALS (BELOW).

MIKE GADDIS

THERE WAS A HEAVY DEW IN THE EARLY SEPTEMBER morning air, and the high humidity created a distorted landscape. Longleaf pine cones looked like footballs; crows looked like ravens. As I drove leisurely along Tower Road through the Sandhills Game Land, a dark lump appeared ahead, right in the middle of the road. "A bear cub!" I thought, until my senses returned and I realized that there aren't any bears in these parts. A dip in the road allowed me to move forward without being seen, and at the next crest I was no more than 50 yards from a bobcat! My intrusion sent it galloping off through the wire grass and longleaf pine. Although that is the only bobcat I have seen on the game land, it is indicative of the many surprises found here.

On that morning three years ago, I began a botanical and natural areas inventory of the western half of the Sandhills Game Land. Back in 1993 and 1994, a colleague and I surveyed the eastern half. The more recent work would complete the inventory, one of very few such studies of game lands in North Carolina.

The Sandhills Game Land occupies nearly 60,000 acres in parts of three counties—Moore, Richmond and Scotland, midway between Southern Pines and Rockingham. U.S. Highway 1 bisects the property into nearly equal halves. Most of the land was originally bought by the federal government during the Great Depression and later used as a World War II training facility. After the war, part of the property was retained by the government as Camp Mackall; the rest was turned over to the North Carolina Wildlife Resources Commission to manage, with a provision that ownership of the land would revert back to the federal government in case of national emergency. Currently, the Wildlife Commission manages the game land for multiple uses, including hunting, bird dog field trials, wildlife and rare species conservation, horseback riding, fishing, pine-straw raking, canoeing, timber sales, hiking and limited military exercises. For all this use, it is surprising that more people don't know about the place; I routinely find people in my town who haven't heard of it. But what a hidden treasure!

What makes the Sandhills Game Land special? Many people know that it supports one of the most extensive stands of longleaf pine remaining in North Carolina. The stately pines, coupled with several kinds of scrubby oaks and abundant wire grass, give the place its characteristic appearance. But there are more fundamental reasons for its uniqueness. First, the game land lies within the Sandhills region, a narrow but unique geological area at the boundary between the flat Coastal Plain and the hilly Piedmont stretching from North Carolina to Georgia. The Sandhills marks the farthest advances of the ocean onto the continental shelf, some 2 million years ago. The sterile, sandy soils we see today originally were laid down as seaside dunes. Ancestors of my bobcat may have hunted for beach voles and shorebirds.

Over time, as the ocean receded and as the Appalachians and Piedmont weathered down, other sediments mixed with the dune sand to form our familiar white-to-grayish-to-yellowish soil, often with a clay sublayer. The various dune- and soil-building processes created the characteristic Sandhills topography: rolling hills dissected by myriads of creeks. Elevations on the game land run from 230 feet at Drowning Creek to 550 feet near Plainview. Most drainage creeks lie 50 to 90 feet below the surrounding hilltops and plateaus. A number have been impounded for recreation activities (or formerly for powering sawmills and flour mills). Since the game land lies atop a watershed divide, creeks drain either southwesterly to the Pee Dee River (via Hitchcock Creek) or southeasterly to the Lumber River (via Drowning Creek).

Aside from the physical environment, there is one factor that more than any other contributes to the Sandhills' special nature—fire. Nowadays that means prescribed burning (also called controlled burning) of designated blocks of land, but in presettlement times fires periodically swept through whole landscapes. In areas that have a long burn history, a given fire will consume grasses, herbs,

and some shrubs and saplings but will merely char the outer bark of adult trees. If hot enough, such fires can burn right through wet streamheads, often kill-ing adult trees. Curiously, one tree requires such conflagrations for long-term survival: seeds of the Atlantic white cedar, or juniper, rarely germinate unless the dense canopy of adults is burned off. The large population of this species on the game land along Hitchcock Creek and its tributaries attests to a long relationship with hot fires. Ecologists reckon that big fires historically occurred at very irregular intervals, perhaps once every 50 years or more, but that low-intensity, or "cool," fires occurred every one to six years in the Sandhills, depending on the site. This went on for thousands of years all over the range of the longleaf pine.

Today's prescribed burns do more than merely remove aboveground portions of herbaceous plants. They reduce the "fuel load," so that chances of hot fires are significantly lessened. In areas that burn regularly, tussocks of wire grass (*Aristida stricta*) act as the main fuel supply and produce low-intensity fires. But in fire-suppressed areas, scrubby oaks and shrubs produce intense heat, enough to kill many adult pines. Fires also reduce the thick vegetative cover of wire grass, thus allowing dozens of other grasses and herbs to flourish—for a few years, that is, until covered over by the ever-growing wire grass clumps. The flush of plant growth following fire provides quail, turkeys, deer, fox squirrels and other wildlife with food, cover and nesting material. By consuming vegetation right to the ground, fires also prepare bare-soil seedbeds. Heat from fires triggers the germination of seeds that lay dormant below the soil surface. Seeds of many plants, including longleaf pine, germinate poorly or not at all in the absence of fire. Ashes from consumed plants provide minerals and nutrients to the newly germinated plants and to new root sprouts, and thus the cycle of life is renewed.

Prescribed burning is quite an art form in itself. To be effective, the fire must burn the designated block only and must burn within a safe range of temperatures: hot enough to remove the herb layer but cool enough to spare the trees. This calls for a deep knowledge of fire behavior (something gained over years of observation), based on a thorough understanding of the effects of wind velocity and direction, humidity, ambient temperature, fuel load, soil moisture and smoke dispersal. One of the best anywhere at this art is Bill Parsons, a wildlife forester with the Wildlife Resources Commission. Bill and his crew have conducted prescribed burns at the game land for many years and now safely burn some 14,000 to 15,000 acres each year, two-thirds of it during the growing season. After consulting with foresters and biologists, as well as with ecologists and endangered-species experts, Bill has settled on a three-year fire rotation as optimal for the Sandhills Game Land. Not every block burns that frequently; for example, areas dominated by hardwoods might burn every five to six years, and creek swamps not at all. On the other hand, a couple of streamhead sites are burned annually and are reverting to canebrakes, a nearly extinct vegetation type in North Carolina. You can view one of these endangered plant communities, the Scotland Lane Annual Burn Site, right from the road of that name.

What is the result of all this fire? Nothing short of a natural paradise. Hunters exclaim about the high yields of deer and game birds. Biologists come here to observe natural populations of the rare fox squirrel.

BOBWHITE QUAIL ARE JUST ONE OF THE MANY SPECIES OF BIRDS AND MAMMALS THAT THRIVE IN THE RICH LAYER OF HERBS AND GRASSES THAT FLOURISH AFTER FREQUENT FIRES ON THE SANDHILLS GAME LAND.

DERRICK HAMRICK

BRUCE A. SORRIE

EXTENSIVE STANDS OF LONGLEAF PINE MIXED WITH WIRE GRASS AND SCRUB OAK GIVE THE SANDHILLS THEIR CHARACTERISTIC APPEARANCE. ONCE COMMON THROUGHOUT THE SOUTHEAST, THE LONGLEAF PINE ECOSYSTEM IS ONE OF THE MOST ENDANGERED IN NORTH AMERICA.

Birders flock here to catch a glimpse of endangered red-cockaded woodpeckers and to hear the sweet trill of Bachman's sparrows, both fire-adapted species that thrive on the game land. Elusive Swainson's warblers skulk in cane thickets along Drowning Creek; only their ringing song belies their presence. Lark sparrows, nearly extirpated as a breeder in North Carolina, are found only in the Sandhills region. Anglers try their skill for bass and crappies at a number of impoundments, but in general, fish are not well represented in the acidic waters of the game land. However, two fish species—the pinewoods darter and the Sandhills chub—are practically confined to the Sandhills region. Herpetologists visit the Sandhills hoping to uncover rare pine snakes, canebrake rattlers, eastern coachwhips and coral snakes, as well as glass lizards and a number of amphibians. Although the term "Sandhills" conjures up images of droughty soils and dry landscapes, the associated wetlands are chock-full of frogs, toads, turtles and salamanders. One remarkable wetland on the Sandhills Game Land is called 17-Frog Pond, because of the high diversity of frogs and toads that breed there. Among those species that are eagerly sought on the game land are the rare pine barrens tree frog, the eastern spadefoot toad, the oak toad, the carpenter frog and the tiger salamander. Lepidopterists have documented a number of unusual butterflies and moths, including several rare skippers, the mottled duskywing and the Hessel's hairstreak, which inhabits Atlantic white cedar groves in the Hitchcock Creek drainage.

Now on to plants. To date, botanists have documented 972 different kinds of vascular plants (ferns, conifers and flowering plants) on the game land. Nearly half of all species belong to just four families—grasses, composites, sedges and beans. At 150 species, grasses are the most numerous, followed by the aster-goldenrod family with 128. In an ecosystem where wire grass is king, it seems incredible that so many other grasses should occur; yet in loamy soil sites I have tallied more than 25 species in a single acre. Such high grass diversity can be attributed to the plants' adaptability to disturbance, such as recurring fire, and to an affinity for the high light levels of these open-canopy pinelands.

At 70 species, the bean family is also remarkably diverse on the Sandhills Game Land and has lent its name to a unique plant community called the pea swale (also known as bean dip). Scattered across the game land, pea swales are shallow depressions in which loamy soil develops, supporting a rich herb layer. More than 20 bean species have been recorded from a single swale. Along with the many grasses and composites found in them, the bean dips act as natural feeding stations for quail, turkeys, doves and other wildlife. Many years ago, wildlife researcher H.L. Stoddard documented the importance of legumes in the diet of quail in southern Georgia. His studies

"Aside from the physical environment, there is one factor that more than any other contributes to the Sandhills' special nature — fire."

"With so many features and rare species, the Sandhills Game Land is one of North Carolina's natural gems."

WETLANDS ON THE SANDHILLS GAME LAND SUPPORT A REMARKABLE DIVERSITY OF AMPHIBIANS INCLUDING THE RARE PINE BARRENS TREE FROG.

JACK DERMID

showed that legumes constitute 21 percent of the average monthly diet of bobwhites, but in winter this figure may climb to more than 50 percent.

To many people driving through the Sandhills, the game land seems uninteresting—endless pine-oak woodlands with wire grass blanketing the ground. Take a walk into the various kinds of plant communities, however, and you will be surprised at the different kinds of plants you will encounter, their varied colors and their interesting forms. In general, wildflower walks are best taken during the first two growing seasons following a fire, when the flush of herbs is strongest. Although any time is fine, mid-May through early June and mid-September through mid-October are best for seeing the most diversity of flowers. March brings the diminutive blooms of pyxie moss in wet streamhead margins, while fragrant trailing arbutus and cushions of pineland phlox brighten dry uplands. Soon after, yellow pitcher plants put out their bizarre flowers and new trumpetlike leaves in boggy streamheads and pond margins, while sandhill lupine, bird's-foot violet, dwarf iris and fringed bluestar grace the uplands.

The May-June peak boasts rose pogonia and grass-pink orchids along with savanna meadow beauties, toothache grass and shrub honeycups in streamhead margins, while sandhill wild indigo, man-root (a morning glory) and sandhill roseling endure even the driest of uplands. In gum swamps fetterbush, dog-hobble and Virginia sweetspire bloom unseen except by canoeists. The sultry days of July and August have their own appeal: brilliant orange-fringed orchids, various St. John's worts and milkworts, sweet pepperbush, yellow-eyed grasses, narrowleaf sabatia and abundant yellow bushes of sticky false foxglove. It is during the September-October peak that the Sandhills is perhaps at its floral finest, when asters, golden asters, goldenrods, blazing stars, thoroughworts, chaffheads (all members of the aster family), threadleaf gerardia, Indian grass, several bluestem grasses, dropseeds and plume grasses all put on their finery in a display that's hard to beat.

But it's not over then, for nature sometimes saves the best for last. When the cold north winds of late October and November have shut other plants down, the deep blue-violet flowers of autumn gentian bloom amid the wire grass, while the paler blue tint of creekside gentian pokes up from wet moss in streamheads.

To date, 44 state or federally listed rare plant species have been documented from the Sandhills Game Land. Three of these are federally listed as endangered. Michaux's sumac (*Rhus michauxii*) is a 1- to 2-foot,

nonpoisonous shrub that grows in loamy soil flats and pea swales. With 20 known populations, the game land is vital to the sumac's survival. Once, while mapping one of the populations, Bill Parsons and I flushed a hen turkey up from a nest of 13 eggs! This very spot had burned just 12 months previously. The sumac's leaves turn a brilliant red in the fall. Rough-leaved loosestrife (*Lysimachia asperulifolia*) occurs only in a 15-county area of North and South Carolina. It is very rare on the game land (only four populations) but fares better on Fort Bragg and on the outer Coastal Plain, including Holly Shelter Game Land. This handsome plant blooms in late May to mid-June in boggy streamheads and their margins, also the habitat of pine barrens tree frogs. One population occurs on the boggy shore of Crawford Lake, along with yellow pitcher plants. Chaffseed (*Schwalbea americana*) is exceedingly rare on the game land—only one population, discovered in 1997. Once found in at least 14 states from Massachusetts to Louisiana, chaffseed has disappeared from all but six. The reason? This plant requires very frequent fire for proper germination and survival, on the order of every one to three years. Today its strongholds are in artillery impact areas of military bases and on quail plantations with natural longleaf pine communities.

Other plants are rare at the state level. White wicky (*Kalmia cuneata*) has white flowers like its relative mountain laurel (*K. latifolia*), but it is half the size, including the nonevergreen leaves. It is difficult to see among the other shrubs in wet streamhead margins. White wicky occurs only in 11 counties of North and South Carolina. Southern white beaksedge (*Rhynchospora macra*) was once thought to be a plant of the Gulf Coastal Plain, but recently has been found in a number of sites in the Sandhills region of the Carolinas. It is one of many plants that thrive in and around beaver ponds. Blue or azure sage (*Salvia azurea*) is handsome enough to be in the horticultural trade. Last seen on the game land in the early 1970s, it was feared lost until rediscovered in 1997 in a longleaf-wire grass upland that burned a few months earlier.

To a botanist's mind it seems incredible that in this day and age there is an undescribed lily in states as well studied as the Carolinas. Yet it is true. Restricted to wet or boggy streamheads in the Sandhills, this striking lily does not match any other in North America. It seems closest to the rare pot-of-gold lily (*L. iridollae*) of the Gulf Coast but differs in important ways. It also shares some features with

BRUCE A. SORRIE

BRUCE A. SORRIE

BOTANISTS HAVE DOCUMENTED NEARLY 1,000 DIFFERENT SPECIES OF PLANTS ON THE SANDHILLS GAME LAND INCLUDING THE RARE WHITE WICKY (ABOVE), WHICH OCCURS IN JUST 11 COUNTIES IN THE CAROLINAS, AND THE SANDHILLS LILY (LEFT), WHICH HAS BEEN FOUND NOWHERE ELSE ON EARTH.

Michaux's lily (*L. michauxii*) and with the Turk's-cap lily (*L. superbum*) but differs sharply from both. At 3 to 5 feet tall and with one to five bright orange to red flowers, the Sandhills lily is a knockout, but difficult to find because it occurs in very small numbers, seldom more than five at a given site, and often just one.

With so many features and rare species, the Sandhills Game Land is one of North Carolina's natural gems. Yet its importance extends well beyond that. With the continuing reduction of the natural longleaf pine ecosystem throughout the Southeast, this game land will become increasingly important as a reservoir for biological diversity. And the true wonder is that it is open for all to discover and enjoy. ⊠

Bruce A. Sorrie is a botanical consultant who lives in Whispering Pines.

Bridging The Gap

WRITTEN BY LAWRENCE S. EARLEY©2001

An unusual new conservation partnership in the Sandhills promises a landscape-wide approach to endangered-species protection.

Ecologist B.W. Wells once described the Sandhills as "Deserts in the Rain," referring to the deep, sandy soils of its uplands. Paradoxically, however, the Sandhills harbors some of the most diverse ecosystems east of the Rocky Mountains. Two large public lands, Fort Bragg and the Sandhills Game Land, contain more than 120,000 acres of well-managed longleaf pine, one of the most endangered ecosystems in North America. Botanists on the military base have found in excess of 1,100 plant species, several of which have been found nowhere else. Scores of grass species and dozens of legumes provide food for a wide assortment of wildlife species. Five federally endangered species occur here, including the red-cockaded woodpecker, and more than a dozen others are on a variety of state and federal candidate lists.

The Sandhills is a growing human habitat as well, covering parts of six North Carolina counties and extending into South Carolina and Georgia. The North Carolina Sandhills contains a major military installation (Fort Bragg), a popular state game land (Sandhills Game Land), scores of world-class golf courses, and thriving communities where retirees jostle with locals to enjoy the region's prosperity.

This mosaic of private and public lands is the focus of an unusual alliance of state and federal agencies and private conservation groups, with the participation of local citizens and governments. Formed in June 2000, the North Carolina Sandhills Conservation Partnership wants to develop a strategy that would protect not only the red-cockaded woodpecker but also the longleaf pine and other ecosystems in which they are found. This signals a growing awareness among many in the conservation community that protecting endangered species requires a new approach—an ecosystem approach on a landscape-wide scale.

"Concern for the red-cockaded woodpecker may still be driving the conservation train in the Sandhills," says Pete Campbell of the U.S. Fish and Wildlife Service, "but the partnership's mission is much broader—to conserve entire communities of plants and animals."

At least superficially, the individual partners seem to have wildly incompatible aims, hardly the stuff that partnerships are made of. This partnership includes the U.S. Army, whose mission is to train soldiers at Fort Bragg, the sprawling military installation, and the Sandhills Game Land, owned and managed by the N.C. Wildlife Resources Commission, which conserves wildlife and wildlife habitat. There are the North Carolina chapter of The Nature Conservancy, whose aim in the Sandhills is to save the best remaining examples of important natural communities, and the U.S. Fish and Wildlife Service, which protects endangered species. The Army Environmental Center helps military installations meet their environmental responsibilities, and the Sandhills Ecological Institute represents more than 20 years of seminal research on the red-cockaded woodpecker and longleaf pine ecology.

What common ground can such different groups occupy?

"Each of the partners has very different goals," admits Michael Lynch, chief of the U.S. Army's training division at Fort Bragg and chairman of the partnership's steering committee. "But we have several areas in which our common interests overlap, and where they do, it gives us the opportunity to help each other protect this land."

"The partnership's mission is much broader — to conserve entire communities of plants and animals."

A common dilemma facing both the game land and Fort Bragg, for example, is encroachment by residential developments along their borders. In some cases the army has been forced to curtail training exercises in order to be a good neighbor. Fort Bragg needs additional land buffers to protect its training mission, but so does the game land for its wildlife-management purposes. New residential developments also pose conflicts between forest managers' need to burn their longleaf pine woodlands and their concern for road safety, health and other issues related to smoke management. The very different missions of two entities are being compromised by the same problem.

Protecting the red-cockaded woodpecker is also a common interest of both Fort Bragg and the Sandhills Game Land. Once numerous throughout the pinelands of the Southeast, the bird has been declining in numbers since the late 1800s because of the loss of its primary habitat, open forests of old longleaf pine trees.

Army soldiers train at Fort Bragg, which is also home to one of the largest populations of the endangered red-cockaded woodpecker (facing page). A new partnership hopes to protect endangered species on the military base and across the Sandhills.

COURTESY OF U.S. ARMY

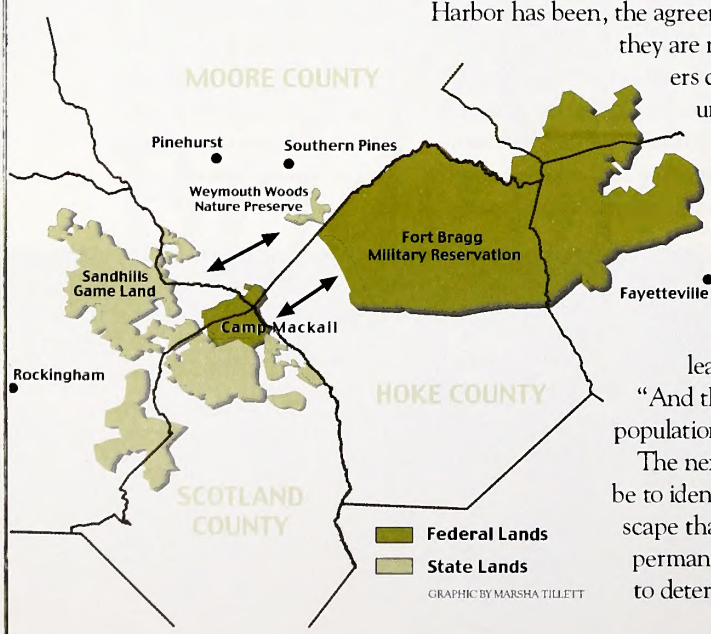
JACK DERMID

MAKING THE LINK:
A NEW CONSERVATION PARTNERSHIP HOPES TO PROTECT ENDANGERED AND ISOLATED ECOSYSTEMS BY PURCHASING PROPERTY AND EASEMENTS TO CONNECT LARGE BLOCKS OF FEDERAL- AND STATE-OWNED LANDS IN THE SANDHILLS.

Longleaf forests are believed to have once comprised about 92 million acres from southeast Virginia to east Texas, but the forest has been reduced by about 95 percent, isolating the woodpeckers in about 15 major populations across the Southeast, with a total of about 12,000 birds. The Sandhills population is considered the second largest, although it is split into two subpopulations that are physically separate. Some groups are isolated from each other on the game land or on Fort Bragg, but in other cases the birds are separated by privately owned lands that are being clear-cut or developed. Forested corridors to link these isolated woodpecker populations would promote the stability of the Sandhills population, but how do you secure these corridors in a landscape with such a mixed ownership of public and private lands?

In the past decade, funding programs have been established to encourage private landowners to restore longleaf pine habitat and help the beleaguered woodpecker. Perhaps the most successful of these programs is the Safe Harbor Program, introduced by the Fish and Wildlife Service in 1994. Landowners participating in Safe Harbor agree to maintain the habitat for existing woodpeckers on their land but are relieved of responsibility for any additional birds that might occur as a result of their management.

Safe Harbor has been a tremendous success, says Pete Campbell, the Fish and Wildlife Service recovery coordinator for the N.C. Sandhills. Currently 51 Sandhills Safe Harbor agreements are in place, representing more than 35,000 acres that support 49 groups of red-cockaded woodpeckers. But as good as Safe Harbor has been, the agreements have a limitation—they are not perpetual. Landowners can meet their obligations under the agreement and then, in time, decide not to continue with it.



GRAPHIC BY MARSHA TILLETT

"The Safe Harbor Program has provided private landowners with incentives to restore a lot of longleaf habitat," Campbell says. "And that will help stabilize a population that is declining."

The next step, he says, would be to identify key areas on the landscape that are candidates for more permanent protection, and then to determine whether a willing owner might sell the land or grant a conservation easement. A conservation easement enables a landowner to keep the property but sell or donate certain rights, such as development rights, in exchange for tax advantages. "If we can, at a minimum, purchase the development rights to these properties so we know they will always remain forested, then we have achieved an important milestone in our conservation strategy," Campbell says.

This is what the Sandhills Conservation Partnership has set out to do, but it is going about it in a unique way.

"If you were to visualize the Sandhills from a biological perspective," Campbell says, "you'd ignore ownership boundaries. You'd analyze the landscape as a whole and identify where and how to focus your conservation efforts. Once you knew that, then you'd consider who owns the land and how you could work with the landowner to conserve and manage it."

The partnership is doing just that—considering the entire Sandhills landscape as a unit and viewing it from an ecosystem perspective. This holistic landscape approach to conservation differs from conventional efforts to protect endangered species. It requires conservationists to look at entire ecosystems, using much larger spatial scales than before—entire river drainages, in some cases. Protecting an entire landscape would include more than a single endangered species.

It's an idea known as ecosystem management, but in the example being pioneered by the Sandhills partnership, "it's ecosystem management within a human-influenced environment," as Campbell puts it. Ecosystem management is a way to look up from the trees and see not only the forest but also the larger landscape beyond—a landscape of forests, streams, rivers, farms, towns and cities. A landscape, in other words, that includes the human dimension.

"On the one hand, it's a matter of landscape scale," says Sam Pearsall, with the North Carolina chapter of The Nature Conservancy, and a member of one of the partnership's working groups. "But on the other hand, it's a matter of integrating human concerns—economic development, army training needs, institutional missions—as well as conservation. With this approach, there's room for woodpeckers to carry on their lives and for people to live, to land planes and to train troops. We can do all this if we get the management right."

What kinds of specific protection strategies does the Sandhills Partnership intend to use? Campbell says that he envisions several different kinds of protection, what he calls "layers of protection,"on both public and private lands:

MELISSA McGAW

- Existing public lands—the Sandhills Game Land, Fort Bragg, Camp Mackall, Weymouth Woods Sandhills Nature Preserve.
- Lands that might be purchased by private conservation groups such as the Sandhills Area Land Trust, based in Southern Pines, or the North Carolina chapter of The Nature Conservancy. Such lands could be managed by the groups themselves or sold to appropriate managing partners such as the Wildlife Commission.
- Private lands with a conservation easement attached, guaranteeing that the lands would be managed in perpetuity.

As an additional strategem, the Fish and Wildlife Service has proposed to establish a Sandhills National Wildlife Refuge. It would be a unique kind of refuge, the partners say, one that would allow the greatest flexibility. "If the refuge idea is approved, we will seek to purchase key tracts of land or, alternatively, conservation easements from willing sellers," Campbell says. Some lands could be administratively considered part of the refuge but still owned by private landowners. If the landowner did not want public access to the land, he wouldn't sell this right.

"The refuge is not going to be an enclave owned and operated by the Fish and Wildlife Service," adds Pearsall. "Maybe there would be some Nature Conservancy land involved, or lands belonging to other agencies. This refuge is going to be innovative and creative in the same way that the partnership is."

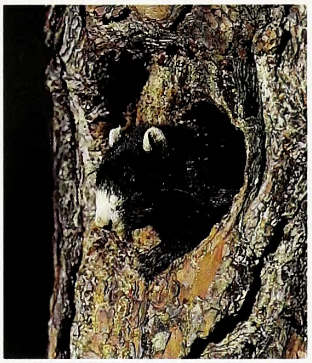
The group is guarding against the perception that it is a bunch of outsiders trying to "grab" land. It has involved representatives from local communities in some of its working groups—teams of biologists and foresters, forest consultants, local real estate agents, pine straw rakers and municipal and county representatives. Stakeholder meetings have been going on since last September, and participants emphasize the consensual and inclusive nature of the group.

"What we have attempted to do is create a true partnership that includes many stakeholders in the planning process right from the beginning. We are working to coordinate our planning efforts with those of other groups, such as the Fort Bragg-Pope Air Force Base Regional Land Use Advisory Commission," Campbell says. "As an example, the advisory commission is trying to update a 1991 joint land-use study for the six counties of the Sandhills. The original study did not really address conservation issues such as habitat protection or green space. We hope to include conservation recommendations in the commission's new joint land-use plan."

So far, The Nature Conservancy, acting as the partnership's real estate agent, has purchased four tracts of land using a variety of funds—Fish and Wildlife Service, (Section 6 funding), a National Fish and Wildlife Foundation grant, The Nature Conservancy and Army Cooperative Agreement, the Natural Heritage Trust Fund and other state funds. Also, private funds have been used to match the Fish and Wildlife Foundation grant. Two of these properties, the Horse Creek Tract of Moore County (547 acres) and the Parsons Tract of Richmond County (333 acres), will be managed as part of the Wildlife Commission's Sandhills Game Land.

"All of us realize that the Sandhills is a very important area," Michael Lynch says of the partnership. "And it doesn't take a big leap of faith to know that if we don't do something now to protect it in perpetuity, then in five to 10 years that land will be changed into something else." ⊠

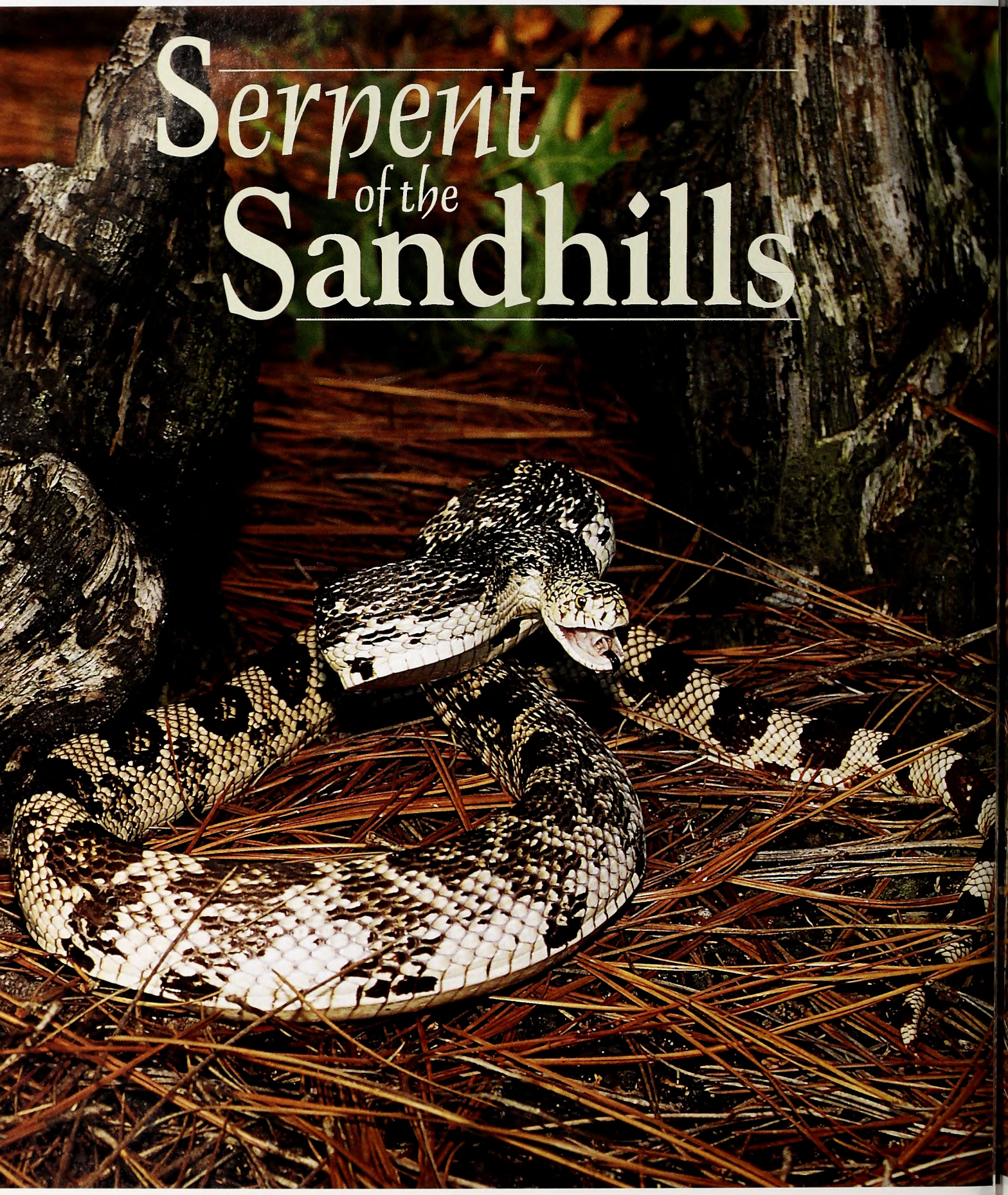
Lawrence S. Earley is a former editor of Wildlife in North Carolina.

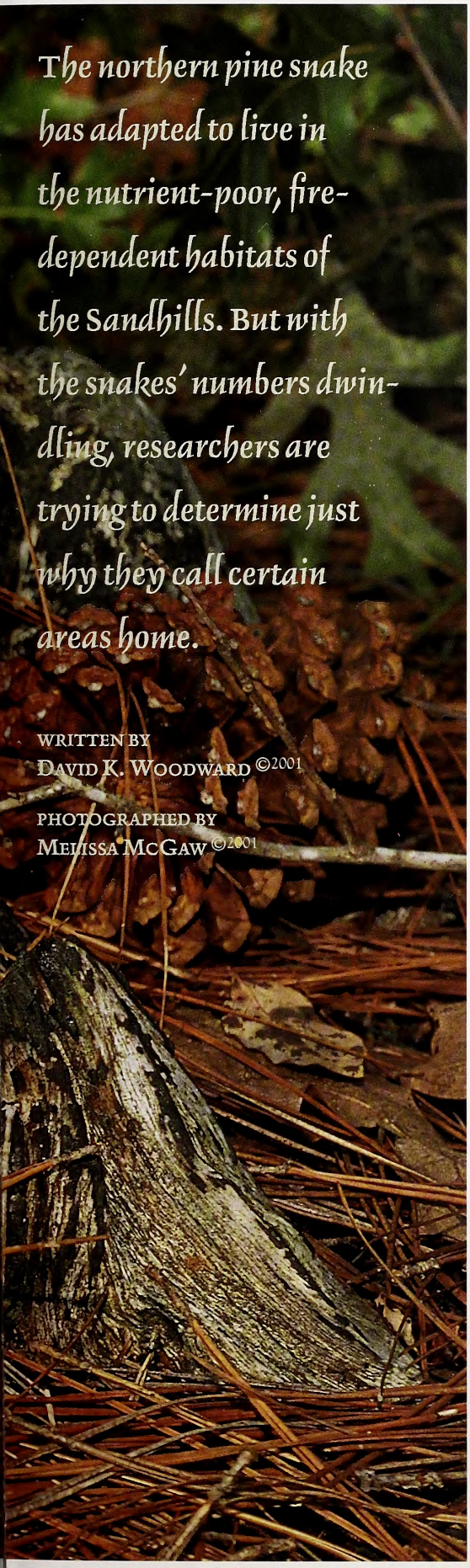


DERRICK HAMRICK

FOX SQUIRRELS AND A VARIETY OF OTHER SPECIES INCLUDING HUMANS DEPEND ON THE VANISHING LONG-LEAF PINE ECOSYSTEMS. A DIVERSE GROUP OF PARTNERS IS ATTEMPTING TO BALANCE THE NEEDS OF HUMANS WHILE PROTECTING WILDLIFE IN THE SANDHILLS.

Serpent of the Sandhills





The northern pine snake has adapted to live in the nutrient-poor, fire-dependent habitats of the Sandhills. But with the snakes' numbers dwindling, researchers are trying to determine just why they call certain areas home.

WRITTEN BY
DAVID K. WOODWARD ©2001

PHOTOGRAPHED BY
MELISSA MCGAW ©2001

I SHOULD HAVE NOTICED THAT EVERYONE WAS WATCHING ME AS I OPENED THE LID AND STUCK my hand in to retrieve the canned drinks this hot summer day in the Sandhills. A 6-foot, hissing, striking beast rose up out of the cooler, causing me to fall backward in alarm. Laughter erupted, and I remember having a hard time convincing my mischievous colleagues that it was indeed "love at first fright." That was 20 years ago.

However, I'm quite sure my colleagues believe in my dedication now, after I have spent two decades thoroughly engrossed in studying the "beast"—the northern pine snake (*Pituophis melanoleucus melanoleucus*)—throughout its range, especially here in North Carolina. I have tried to learn as much as possible about this reptile, because time may be running out for this snake.

The northern pine snake is considered a species of special concern by the North Carolina Wildlife Resources Commission because its numbers are dwindling and its range in the state is limited to the Sandhills. Human activities and development in the Sandhills continue to take their toll on the pine snake in the few places where the animal still exists.

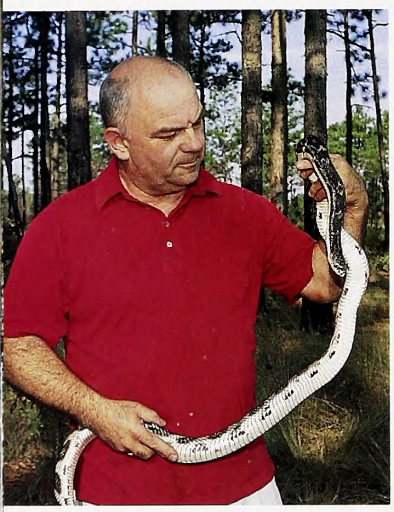
Why should anyone care about this big, noisy snake, which scares people even though it is nonvenomous? Because many wildlife species including the pine snake are impacted daily by the loss of Sandhills habitats.

How much Sandhills habitat do pine snakes need to survive? And what can be done to prevent them from being wiped out? Most of the answers to these and other questions will have to wait for research funds to finance a proposed life-history study of North Carolina's remaining population of northern pine snakes. These monies will be used to purchase and surgically implant radio telemetry transmitters into a sample of pine snakes obtained from the Sandhills region. Released back at the capture site, each snake will have its daily movements mapped to document how and why it selects and uses the variety of needed resources that make up its home range. Until then, we can examine a few results from some initial investigations conducted in North Carolina and review findings obtained from extensive studies on a New Jersey northern pine snake population. We believe that the results of this study will provide comparative studies on this species in North Carolina.

The northern pine snake belongs to the family Colubridae, which contains about 1,800 species, more than any other family of snakes worldwide. The genus *Pituophis* comprises the bull, gopher and pine snake groups. The first two groups live primarily in dry, treeless habitats characteristic of the desert and prairie grassland ecosystems found throughout the western United States. With the exception of the Louisiana pine snake (*P. m. ruthveni*), most pine snakes, in contrast, live east of the Mississippi River.

Some herpetologists believe that the historic range of the northern pine snake extended from Alabama into South Carolina and all the way to New Jersey. However, the present-day range of this snake is patchy and, with the exception of a handful of northern pine snakes located in the mountains of Virginia—none are found between those in our North Carolina Sandhills and a small New Jersey population.

Although record lengths of western bull snakes approach 8 feet, eastern pine snakes rarely exceed 6 feet. But the entire genus is stout, with adults often attaining a diameter of several inches at mid-body length. Another similarity with pine snakes is their camouflage coloration of whites, tans, browns and blacks, mimicking the earth tones of the habitats in which the reptiles live. All members of the genus are infamous for their intimidating behavior of coiling, loud hissing, striking the tail against leaves to imitate a rattlesnake noise, and—if necessary—striking and biting anything believed to be a threat (such as someone reaching into an ice chest for a well-deserved drink).



THE AUTHOR HOLDS A NORTHERN PINE SNAKE HE DISCOVERED WHILE LOOKING FOR NESTING AREAS. THOUGH NONVENOMOUS, THESE SNAKES HAVE A REPUTATION FOR COILING, HISSING AND STRIKING THEIR TAILS AGAINST LEAVES TO IMITATE THE SOUNDS OF A RATTLESNAKE.

In 1991, I obtained funding from the N.C. Wildlife Resources Commission's Nongame and Endangered Wildlife Program to conduct a field survey update of historical records—mostly DOR (dead-on-road) observations of North Carolina northern pine snakes. I assembled records and related information from fellow herpetologists, friends in the N.C. Herpetological Society, Wildlife Commission biologists and others. I noticed after plotting all but one of the 156 Sandhills sites on topographic maps that every record was located on a sandy soil as defined by county soil maps, with a prevalence of Lakeland and Norfolk series sand types. The snake's affinity for sandy soils apparently is so strong that not one record was located west of U.S. Highway 220, which runs from Candor to Rockingham and sharply defines the boundary of the red clay soils of the adjacent Piedmont region.

Another interesting piece of information from the North Carolina fieldwork indicated that some North Carolina pine snakes are able to live near disturbed habitats such as rural residential areas. For example, of the 156 Sandhills sites I visited, 28 percent were within sight of a barn or similar structure, 42 percent were within 1,000 feet of an occupied dwelling and 20 percent were near trash piles and other debris that the snake probably used as resources for both food (rodents) and cover. Perhaps one of the most important discoveries was that many DOR locations were located adjacent to stands of mature longleaf pine that had been harvested many years ago, with only the stumps left behind. These resin-saturated, rot-resistant stumps and taproots are often known as fatwood or lighter wood.

Because these longleaf pine stumps remain intact in the ground for decades, they may prove to be the most critically important structure available to the pine snake to escape from the elements and locate prey. Between the outer parts of the decaying taproot and old root canals extending outward from the main stump, numerous underground chambers provide a multitude of microhabitats varying in temperature and moisture content. An example of a similar, critically important refuge structure might be the burrows of the gopher tortoise in the southeastern United States, used by a diverse assemblage of animals.

Robert Zappalorti of Herpetological Associates in Jackson, N.J., kindly invited me to visit the Pine Barrens research project in the summer of 1991, where I was subjected to a steep learning curve that included identifying typical nesting habitat, distinguishing true pine snake nest holes from the myriad of other dirt holes found on the floor of a forest, and practicing the fine art of re-excavating a nest tunnel initially dug by a gravid female pine snake. I must have paid attention to my mentor's instructions, because I was fortunate enough in 1994 to locate the first pine snake nest ever found in North Carolina based on nest identifiers, rather than stumbling across one as we had previously.

Aspects of this species' reproductive strategy are unique not only among oviparous North Carolina snakes but also compared to the remainder of North American egg-laying snakes. Unlike most such snakes, which lay their eggs in compost piles, decaying logs or mammal burrows or under surface debris, northern pine snakes laboriously excavate tunnels up to 10 feet in length and 2 feet deep in sandy soils. A tunnel usually ends with an enlarged chamber in which the eggs are deposited. Observations of gravid New Jersey pine snakes in the act of excavating nests revealed an elaborate process of first making test holes to identify potential nest sites. The snakes probed with their noses to assess physical and chemical cues such as the density, temperature and moisture content to determine suitability for tunneling and incubation of an egg clutch. Previously successful nest sites were

"The snake's affinity for sandy soils apparently is so strong that not one record was located west of U.S. Highway 220, which runs from Candor to Rockingham and sharply defines the boundary of the red clay soils of the adjacent western Piedmont region."

confirmed and subsequently reused for years by females identifying scent from underground remnants of old eggshells. Such fidelity to nesting areas can have both good and bad consequences—in New Jersey, 23 of 80 nests were vandalized by human poachers during a three-year period.

Although as many as a dozen eggs may be laid by a single pine snake, the average is about half that number deposited perhaps every other year, resulting in a rather low reproductive potential for the species. However, the four eastern pine snake subspecies lay the largest eggs of any North American snake, including their own western bull and gopher snake relatives. Each egg can measure up to 3½ inches long and 1½ inches wide and will almost double in volume during the two months of development in the underground nest. Egg deposition occurs during early summer, with hatchlings up to 18 inches long emerging from the nest chamber. Such large hatchlings, complete with the species' intimidating defensive behavior of hissing and striking at any threatening attacker, undoubtedly keep many potential predators at bay. The entire nest construction and egg-laying process is quite an accomplishment for an adult snake that may be only 3 to 5 feet long. Because of the amount of time and effort required to complete a nest, it's no surprise that nests excavated during the New Jersey studies often contained egg clutches from several female pine snakes.

Another aspect of northern pine snake ecology that has been extensively studied only in New Jersey is the selection and use of various habitats by both male and female animals. Snakes were surgically implanted with radio telemetry transmitters and their movements tracked over a two-year period. Females often were found under leaves, but males used hollow logs and pieces of bark as refuges. Both sexes avoided wetter habitats, and there was much individual difference in activity patterns, with most snakes either inactive or basking when observed in the field. A particularly interesting finding, similar to that documented in the North Carolina survey update of road-kill sites, was the intense use of human-disturbed habitats such as home sites, abandoned farms, utility rights-of-ways and railroad beds, by both nesting and non-nesting pine snakes. Most of these sites were early-successional habitats, with low-growing or little to no vegetative cover. In another sample of 21 radio-marked pine snakes at a New Jersey golf course, the home range of eight male snakes averaged 153 acres, but that of 13 females averaged 108 acres. The use of radio-marked snakes in the New Jersey studies was critically important in allowing the researchers to follow snakes to hidden refuges and nesting sites that previously had not been located.

How many acres of North Carolina Sandhills habitat does it take to support a male or female northern pine snake? Is it more or less than that reported in other parts of the species' range? Is there enough habitat left in North Carolina to support a viable population of this impressive reptile? And what steps might need to be taken to ensure protection of this reptile's future? At present, we simply don't know the answers to these and other critical questions relating to the future of the pine snake in North Carolina. We do know that many pine snake populations and habitats continue to receive intense development pressure from humans throughout the range of this species.

THE AUTHOR USES A RADIO TELEMETRY ANTENNA TO LOCATE A PINE SNAKE HE HAD CAPTURED EARLIER AND IMPLANTED WITH A TRANSMITTER. BY STUDYING HOW THESE SNAKES USE HABITAT, SCIENTISTS HOPE TO DETERMINE HOW MANY ACRES OF SANDHILLS HABITAT IS NEEDED FOR AN INDIVIDUAL PINE SNAKE TO SURVIVE.

Perhaps the northern pine snake should be included in the list of indicator species of a long-leaf pine ecosystem, such as the red-cockaded woodpecker. The snake has evolved to live successfully in this fire-dependent, nutrient-poor ecosystem, as have many other plants and animals inhabiting this unique ecosystem over thousands of years. The story of the northern pine snake is like an unfinished biography, with the final chapters remaining to be written. Only through timely research will we discover whether the northern pine snake will have a bright future and remain a viable part of North Carolina's natural heritage. ⊠

David K. Woodward is a wildlife research biologist with N.C. State University's Zoology Department.

Garland Pardue admires *a largemouth bass he was able to entice with a silver spoon—the lure he uses above all else.*

One Bass Lure

written and photographed by F. Eugene Hester ©2001

If you could have only one bass lure, what would it be? Five anglers reveal their favorite lure and how to use it.

Most fishermen have big tackle boxes with dozens and dozens of lures of every imaginable type. Some of those lures have not been used in years. Others may be used seasonally or after someone reports good success with them.

But eventually some anglers have enough success with a specific lure that they fish with it exclusively. And the more they fish with it, the more special techniques they develop to increase its effectiveness. Those techniques may involve adding weights, changing colors, modifying hooks or adding scents, as well as adjusting the speed of the retrieve.

Here is how a few anglers I know do it.

Garland Pardue
Silver Spoon with Trailer

Garland Pardue has a strategy for catching bass. "It's simple," he says. "I just use a silver minnow spoon with long plastic trailing legs. This lure is weedless, and I can cast it into weeds and logjams without hanging up. That's where the bass are, and I can run that lure right by them."

I watch as Garland casts the lure into shallow water against the bank. With a steady retrieve and frequent twitches of his rod tip, he adds life to the lure. The long, flexible legs wave as they follow the spoon, giving the appearance of a kicking frog. The spoon wobbles, and the legs seem to swim as the lure comes through the water in shallow weeds.

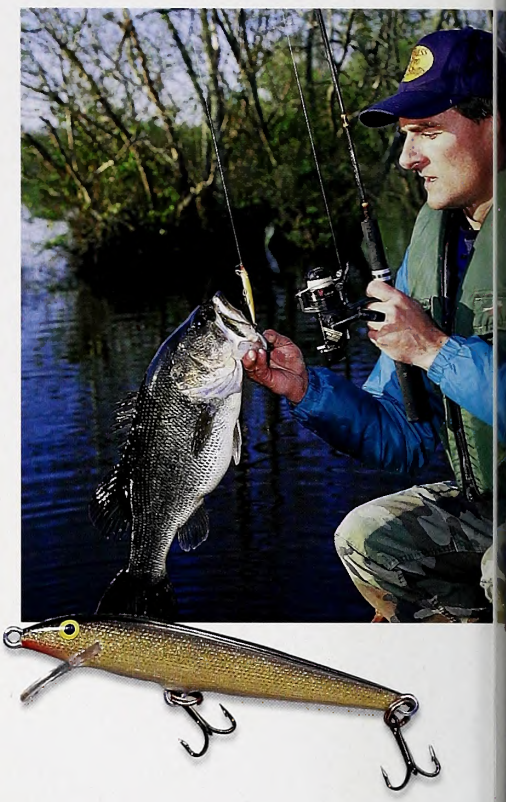
On this trip, Garland lands several nice bass weighing up to 4 pounds. Other fish, too, are attracted to the lure. Two bowfins and a chain pickerel come after it. Bass sometimes make a wake while chasing the spoon in shallow water, adding to the anticipation and excitement.

"I usually fish it with a steady retrieve and rod twitches, but you can retrieve it with a series of stops and starts. Both techniques will work. The important thing is to put it in the right places. I can put that spoon into places that would hang up most lures, and it is heavy enough to cast a long way. By not having to go after hung-up lures and casting farther, I can cover more water.

"This lure has been around for a very long time," Garland continues. "Many people seem to give up on it after a few tries, but I believe they give up before they realize what it can do. And maybe they don't use it in the right places. I think it works best in knee-deep water thick with weeds, or in lily pads, where it is difficult to fish with many other types of lures."

"When I fish thick lily pads, the lure will slide across the pads and fall into the little open-water areas between leaves," he says. "Bass notice the lure as it shakes the leaves crawling across them, and then when it drops into that little opening—watch out! Some strikes are really explosive."

Tom Hester
The Floating-Diving Minnow



Tom Hester points to an assortment of minnow lures in his tackle box. "These are the best lures I have ever found for catching bass," he says. "This is a versatile lure that can be fished in many ways. It floats and works great as a surface lure, but when you retrieve it, it dives and becomes an equally great underwater lure.

"Every fisherman knows that bass eat minnows," Tom continues, "and these lures are a fine imitation of that favorite food. I can just envision a bass waiting under a log for a tasty minnow to swim by, and I like to put an imitation minnow right in front of him."

I watch as Tom ties on a 7-inch minnow lure. Then he casts it near a half-submerged log. For several seconds he lets the lure lie motionless, then he tightens the line and twitches the lure with his rod tip. The lure moves forward a few inches and then floats sideways. After leaving it motionless for several seconds, he repeats the retrieve.

"I get most of my strikes after the first few times I move the lure," Tom explains. "Often it is right after I move it the first time. The bass is watching it and as soon as he thinks it is alive and trying to evade him, he will strike it."

At times bass are interested in the lure only while it is on the surface; at other times they prefer it when it is running under water. Sometimes they are selective about size.

"I have seen times when one of us fishing a 3-inch lure would not get a strike, but another fisherman in the same boat would get a lot of strikes on a 7-inch lure, even from small bass," he says. "And at other times the reverse is true."

One of Tom's special techniques involves slowing the action of the lure when he fishes after a cold front has passed through. "If you see bass follow the lure and then swirl away without striking it, you are fishing it too fast. You have to let the lure sit there a very long time between movements. Give them plenty of time, and sometimes you can convince them to take it."

Another of Tom's techniques is what he calls the run-stop-run technique. After the first few short jerks of the lure, he cranks the reel as fast as he can to cause the minnow to dive and run. After about 3 feet, he abruptly stops the lure. Often a bass will be chasing it, and when the fish runs up on the stopped lure, it will take it.

Carolyn Green-McCall
The Long Plastic Worm

Carolyn Green-McCall is a bass-fishing enthusiast who has caught nice bass across North Carolina. I first learned of her fishing success when I saw a photo of an 8-pound bass she had caught near Reidsville. Later I saw her catch bass on a lake near Raleigh.

"There's only one lure for me," Carolyn explains. "It is a red shad-colored plastic worm—the longest ones I can find, usually the 12-inch ones."

She uses a sliding bullet weight and rigs the worm with the point of the hook stuck into the worm to make it weedless.

"I like to cast it near shore, especially around trees and brush piles. My favorite is a log extending into the lake," she says. "And the best part of that log sometimes is farther into the lake where some of the original limbs are under water. You can't see those underwater limbs, but the bass know where they are, and this is one of my most productive areas."

Carolyn likes to cast the worm and let it lie for several seconds, slowly sinking. "I have my best success when I first start the retrieve," she says. "Usually it is when I move the worm the first foot or so. I catch bass, not only around the shore, but in open water, too. I think a lot of people fishing the shoreline don't seem to realize there are nice bass in the open water. When a bass takes the lure, I wait a few seconds, then sock it to him. Then I jerk the rod a second time. I like to set that hook twice."

Carolyn's photos document a lot of successful trips. But she remembers vividly one bass that got away. "That one broke my rod into three pieces and got away. It was big; I mean really big! And a real beauty, too. I know where he was, and maybe he is still there. Each time I fish that spot, I think maybe he is still there and if I work that lure just right, he might give me another chance at landing him.

"I like to release nearly all the bass I catch. That way I or someone else will have a chance to catch them again," she adds.

Henry Poole
The Plastic Lizard

The most committed single-lure fisherman I have ever known is Henry Poole of Knightdale. He fishes exclusively with a plastic lizard. But it is not just any type of plastic lizard. It has to be a specific brand, size and color. In addition, Henry has developed modifications that he is confident make it an even better lure.

Henry starts with a watermelon-green or kudzu-colored, 6-inch soft-plastic lizard, which he modifies by dyeing the tail a chartreuse color. He rigs it Texas-style with a sliding 1/8-ounce bullet weight and a green plastic bead. He uses a size 3/0 offset worm hook on 14-pound test line and rigs it weedless, with the hook point imbedded in the lure. Then he sprays it with his own special blend of juices made into a strong garlic scent.

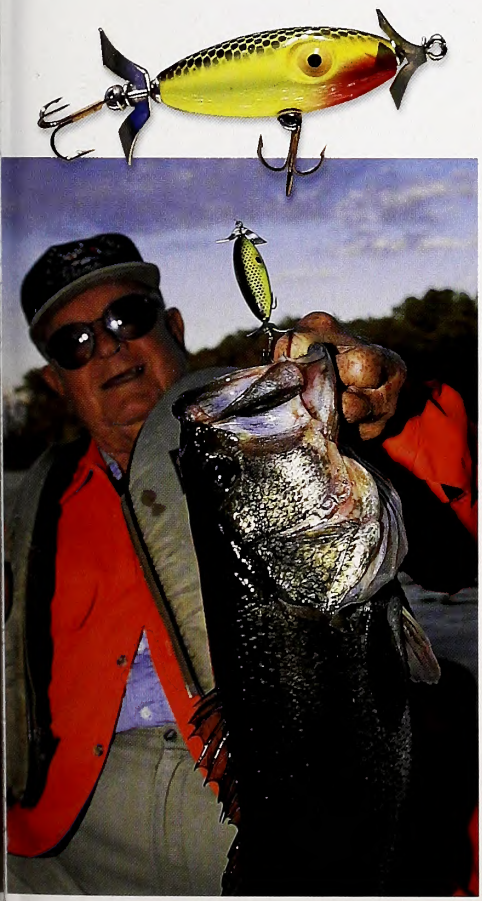
"I fish that lure 12 months of the year, and I can catch bass every month with it," Henry says. "I always fish structure, whether it is trees, stumps, rocks, logs, underwater brush piles or whatever. One of my favorite places is where two or three trees or stumps stand by themselves in water about 3 feet deep. I know I can catch a bass there, and often it is a big one."

Henry fishes with a very slow retrieve. "I like to let the lizard sink on a slack line," he says. "Then I start to reel it in slowly. When a bass picks it up, I wait and let it run for a few seconds before I set the hook."

With a lot of 6-, 7- and 8-pound bass to his credit, Henry has ample evidence that his technique is a good one. Of course, his many hours spent on the water also enhance his chances of being at the right place at the right time.

Henry's reputation as a lizard fisherman is so well known that when a friend saw a photo of Henry holding a big bass, he said emphatically, "I know Henry didn't catch that bass because it doesn't have a lizard in its mouth!"

Ninety-eight percent of the time Henry fishes that plastic lizard. Does he ever vary his lure? He certainly does—sometimes he dyes the tail red and uses a red bead!



Bill Hinnant
The Stickbait with Propellers

Bill Hinnant has been pursuing bass for decades. During that time he has tried just about every conceivable lure, and he has finally found one he considers the best of them all. "I like those floating stickbaits with a propeller on each end," he says. "You can fish it in so many ways. And you can catch a lot of bass with it." Bill has an impressive record of big bass as evidence of the lure's effectiveness and his ability to use it.

Bill's favorite technique is to cast close to shore and let the lure lie perfectly still for several seconds. Then he gives it a little twitch. "On that initial twitch, I do not want the lure to move more than a few inches. I just want any bass that saw the initial splash to see enough movement to become convinced that the lure is alive," he says.

"The lure has to be the right size and have the right action," Bill says. "Often a bass will be right under the lure, watching it and deciding whether to strike. You already have his attention by the splash. Now you need to keep his attention and entice the strike. Usually, a little motion is all that is needed—just a few short retrieves of a few inches at a time. Oftentimes, subtle action is most effective, but sometimes bass seem to want more aggressive action. Those two propellers can kick up a lot of bubbles and make a lot of waves. Sometimes that is what is needed," Bill says. "You have to be responsive to what the bass want. Some days they are easily spooked and a subtle action is best. On other days they are aggressive, and a more deliberate action is better.

"I can vary the retrieve to suit the mood of the bass," he says. "And seeing that bass strike a lure on the surface is a big thrill. I've caught a lot of bass, but I will never be tired of seeing bass strike a surface lure. To me, that is the greatest thrill in all of fishing."

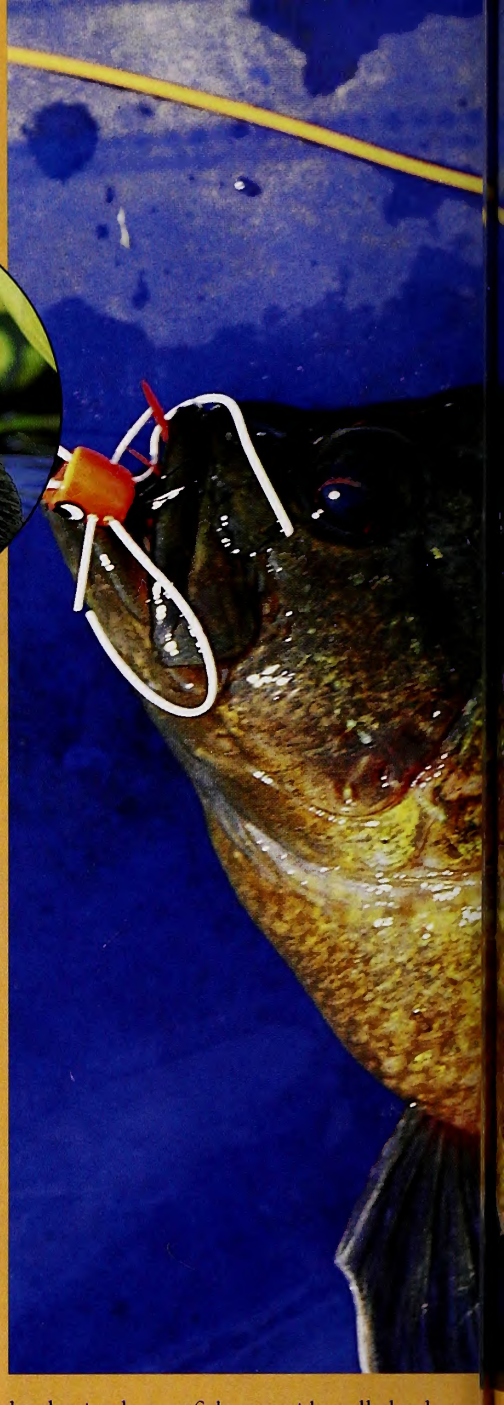
It is apparent that many types of lures are effective at catching bass. Bill Hinnant probably sums it up best when he says, "About any lure in your tackle box will catch bass if you stay with it long enough to learn how and where to use it."

And in case you are wondering what one lure I would choose—it would be a buzzbait. I still have a lot to learn about how to use it, including how to make it run under boat docks and halfway around stumps, but I have seen what it will do. In one month I caught five bass with a buzzbait, each weighing more than 6 pounds, and that is convincing enough for me. ⊠

Gearing up for Panfish

written by Gerald A. Almy © 2001
photographed by F. Eugene Hester © 2001

Fishing for panfish can be simple, but having the proper tackle and lures can improve your odds with these diminutive species.



Mention panfishing, and many who consider themselves expert anglers immediately conjure up a quaint image of an unsophisticated fisherman, with an inexpensive rod and reel or bamboo pole, a container of worms and a few bits of tackle stashed in a pocket.

Well, okay, sometimes it is nice to go after a simple quarry in humble surroundings with a minimal amount of equipment. But there's more to panfishing than first meets the eye, and it's a far more diversified sport than one might assume. Having the right lures, tackle and accessories for different types of panfishing can go a long way toward making a trip successful and rewarding instead of frustrating.

The first fish I caught, like most anglers, were panfish. My father would drive me down to a local lake or river and show me how to bait the hook with an earthworm that we'd dug up earlier behind the house. More often than not we'd land a few fish, or rather I would. A great father though he was, my dad never cared much for fishing. But at least he got me started right. And a worm beneath a bobber is just right. But beyond that, there's a world of refinement and variation to suit the many challenges of the different types of panfishing available in North Carolina.

To get the most out of panfish species, you'll want to consider three major types of fishing and three different outfits that work well in terms of both productivity and enjoyment. You might want to try just one of them, or perhaps all three. But in each case the equipment needs will be slightly different. And besides the three types of outfits, you'll also need a small selection of other items to fully enjoy the thrills of panfishing.

Spinning Gear

If you're just getting started in panfishing or want to confine yourself to just one outfit, this would be it. A light or ultralight rod measuring 5 1/2 to 7 feet is ideal for most situations. Choose a 6 1/2- to 7-foot model if you'll be fishing in open water and may want to cast a long distance, for instance to white bass busting into shad on the surface. For tight work casting to a bluegill bed or probing for panfish in a small stream where distance isn't necessary but maneuverability and accuracy are important, a 5 1/2-foot rod is a good choice.

Rods with ultralight designation are sometimes a good choice, and they're always fun when you hook a good-sized panfish. But be careful. Some of these rods are so flexible and soft that you won't be able to set the hooks well if you have much monofilament line between you and the fish. As a rule, rods designated as light action are often better choices, since they have a bit of muscle at least in the bottom two-thirds or so of the rod. This is important for setting the hook, and in some cases for actually steering a fish away from a snag or bridge piling if you hook a jumbo panfish or accidentally latch onto a bass or catfish.

In the past, beginners started with a spincast, or closed-face spinning reel. There are still a few of these being made, and the quality is definitely better than it was 20 years ago. But anyone who plans to begin seriously angling should skip over these and buy a good open-faced spinning reel. They are not difficult to operate, and you won't have any transition to make if you move on to bass or trout fishing.

Small reels are good choices for panfishing. These can be designated light or ultralight, but I often go with the latter. The only advantage to a slightly bigger reel is that it holds more line, but you don't have to worry about that

with panfish, which rarely strip much line from the spool. When choosing a reel, check the smoothness of operation and also how easily the bail trips. You don't want a rough-working reel or one that takes extra effort to trip the bail. It should flip almost effortlessly as you start to reel back after the cast.

The new fusion or braided lines can be fine for some types of bass, catfish and striper fishing, but for most panfishing, monofilament is generally the best choice of line. It handles well, and a bit of stretch is not a handicap when going after crappies, bluegills, redears and rock bass. Purchase a quality brand, though, so the line will be uniform and without flaws, in 2-, 4- or 6-pound test.

A line that's limp or supple is also preferable to a stiff one. If you have two reels or can buy an extra spool for your reel, it's best to have two different strengths of line available for different fishing conditions. Occasionally 8-pound test can be useful if brush or snags are abundant and the panfish are running particularly large, such as crappies in cover. But generally 4- and 6-pound test are the two most useful line sizes for the vast majority of North Carolina panfishing. Plan on spending from $30 to $90 on a good spinning outfit.

A light or ultralight spinning outfit can be a great choice for fishing live bait when you can work open water or if fish are holding on the edge of cover, where it can be easily cast. For this situation, a slender cylindrical cork, small split shot and long-shank

***Whether you're after** bluegills (inset) or warmouths (above), few fishing techniques can match the excitement of catching panfish with a popping bug and a fly rod.*

fine wire hooks from sizes No. 2 to No. 8 are the only items you'll need. (The fine wire penetrates more easily and sometimes allows you to bend it free when you hang up instead of breaking off; the long shank makes it easier to remove the hook from small mouths of fish like bluegills.)

If fish are hanging particularly deep, you can try a bottom rig attached to a 1-ounce sinker with two hooks rigged on dropper loops or short leaders.

For many species, small live minnows are the best offerings to use with both of these rigs. Either shiners purchased from a bait dealer or minnows caught from a creek will work well. Hook them through both lips from the bottom up or lightly through the back. Crappies, white bass, white perch, rock bass and yellow perch are all minnow eaters. For species such as redears, bluegills and redbreasts, earthworms or pieces of night crawlers are better offerings, as well as crickets and grass shrimp. Try to thread these baits onto the hook to cover most of the wire.

Spinning outfits are also the best rigs in most cases for casting lures to panfish. A variety of artificial lures will work, with some of the best choices being soft-plastic-bodied grubs, marabou jigs, spinners, tiny crankbaits, spoons and small spinnerbaits. Try a variety of retrieves with these lures, but more often than not, the best presentation is slow and steady. Panfish are not known for their speed. They want their meals just crawling along. Sometimes it even pays to fish jigs and grubs beneath a float, so you can pause and let them hang motionless occasionally during the retrieve.

One final tip: Make sure to set your drag light so a fish can pull it off the spool if you hook a brute of a panfish or a larger game fish such as a striper or bass.

Fly Tackle

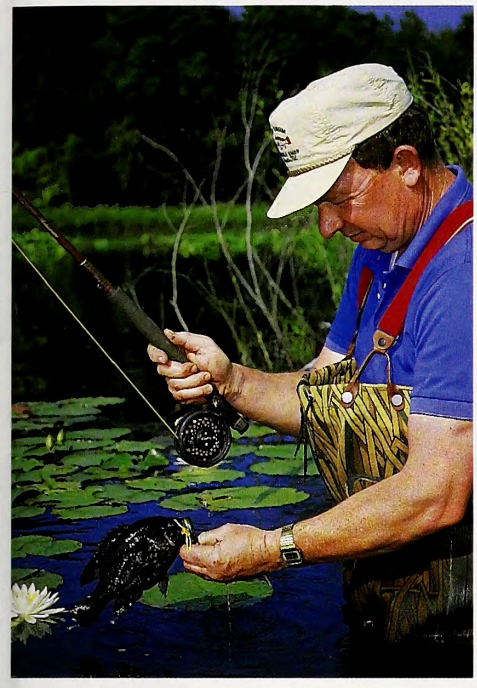
Fly-fishing can seem difficult, complicated and confusing to those who haven't tried it. The idea of casting a line instead of the offering you're presenting to the fish, the challenge of keeping 30 or 40 feet of thick line whipping back and forth in mid-air, the task of learning which fly to use when—all can make you want to just stick with a simple spinning outfit.

Fly-fishing is actually very simple, and there's no better place to take it up than on a farm pond chock-full of bluegills or a creek brimming with redbreasts and rock bass. These fish are eager and willing to take even a sloppily presented fly, and they aren't selective about pattern, color or the proper name of the bug you are trying to imitate. This is not to say that you shouldn't learn good casting principles and techniques when you take up fly-fishing, just that you don't need to have them perfected, because panfish aren't particularly spooky or finicky.

Rent a good casting video or read a book on the subject. Or better still, take a course or get an experienced fly caster to show you the ropes, and you'll find that within a few hours you'll be a surprisingly proficient long rodder. But it's important to start with the right size outfit and balanced gear. An 8- to 9-foot rod is best. This may seem long, but the length actually helps you deliver the fly more effectively and keeps the line up higher off the water or ground if your backcast sags a bit.

The line will be rated with a specific number or weight, and a good choice for panfish is a 4-, 5- or 6-weight line. This weight line will allow you to use the outfit for double duty, for mountain trout. If you want to use the set-up for smallmouths and average-sized largemouths, you can go up to a 7-weight. But for strictly panfishing, a 5- or 6-weight line is ideal. Lines come in different tapers, with the major ones being double taper, weight forward and level. Avoid level lines, since their aerodynamics are poor for casting. Double-taper lines are acceptable for panfishing and will serve nicely on trout streams, particularly small ones where you may have to roll-cast a lot. A weight-forward line is the easiest to cast for panfish and the most efficient. These lines are heavier toward the front, then taper more sharply than a double taper, helping carrying the line (and fly) forward more efficiently.

Why discuss the line before the reel? Because it's actually more important in fly-fishing. The fly reel in panfishing is simply a place to store the line. Buy a single-action model that operates smoothly and is lightweight.



Though a popping bug (left) is a good lure, it's hard to beat a lively cricket under a cork for catching panfish. Light spinning gear is excellent for catching a variety of panfish species including crappies (facing page). Small artificial lures including jigs, grubs and spinnerbaits will all catch panfish if retrieved slowly.

With a nail knot, locking-loop connection or metal eyelet inserted in the fly line, attach a 7½- to 9-foot tapered leader. Whatever you do, don't use a level piece of monofilament as your leader. The energy of the cast will collapse before it fully carries the fly out to the target. Instead, leaders should taper down from a heavy butt (20- to 30-pound test) to a light tippet testing 2 to 6 pounds, depending on what fish you're going after and the size flies you're using. Carry an extra spool or two of tippet material so you can lengthen it after it becomes too short from tying on new flies. A good fly rod, reel, line, leader and extra tippet material can cost anywhere from $60 to $200 or more.

A wide variety of flies will fool panfish. Good choices include sponge-rubber spiders with white rubber legs, small cork or foam popping bugs, wet flies such as the McGinty, Black Gnat and Woolly Worm, and nymphs such as the Hare's Ear, Zug Bug and beadhead caddis pupa, all in sizes No. 8 to 12. For white bass, yellow perch, crappies and white perch, add a few small streamers such as the Zonker, Clouser Minnow and Woolly Bugger in sizes No. 4 to 8.

The best presentation for surface flies such as spiders and foam or cork bugs is to simply drop them on the water and wait. After a long pause, twitch them once, then wait a moment and recast. The longer you can let the bug sit motionless, the more likely you'll draw a strike. Fish nymphs dead drift (floating naturally in the current) in rivers and streams. Wet flies can be fished the same way or with a down-and-across gently twitching motion. Streamers imitate darting minnows and should be presented with a sharp 6- to 12-inch tug, followed by a pause, then another tug.

Cane Poles

Some people consider these strictly child's toys, but a long, light rod that you can use to reach out and put baits or lures next to cover is actually a very efficient angling tool. You can use the humble bamboo pole or modern fancy versions made of fiberglass and even graphite. A small reel can be attached, or the line can simply be tied to the end of the rod's tip. Eight to 14 feet is a practical range in length. Another option is to buy an 8- to 9-foot fly rod, fill a spare reel with 6- to 12-pound monofilament line and use it in lieu of a cane pole.

This type of outfit shines when you're working along the shoreline in an area with flooded trees and brush and want to drop a jig or minnow right down in the middle of the tangles. If you cast with spinning gear into such stuff, you'll likely never get the lure or bait back without hanging up. But by easing up to within pole's reach and dropping the jig or bait straight down into the tangle of cover, you can often get a fish to strike and then work it straight up and out over the brush. If no fish strikes, simply lift the offering straight up and out.

This is also a good rig for fishing along bridge pilings, where crappies and other panfish often like to hang out in summer. You can ease up close and drop the bait or jig right down next to the piling—often the only presentation that will draw a strike from these cover-loving fish. The cost of a cane pole setup can range from $10 to $60. ⊠

Extra Gear

Besides tackle, there are other items you'll want to have for a successful and enjoyable panfish outing.

- **A stringer** or cooler to hold the fish you decide to keep
- **Polarized sunglasses,** which protect your eyes and make it easier to see fish or the cover they might be holding next to, such as submerged rocks or weeds
- **A minnow bucket** or bait container for crickets or worms
- **Clear plastic tackle** boxes for keeping lures, flies, hooks, swivels and split shot organized and readily accessible
- **Nail clippers** for trimming line
- **A hat with a brim** to shield your eyes from the sun
- **Raingear,** sunscreen, a camera and film

It's hard to imagine an insect that people love more than

Ladybugs

written by Buffy Silverman ©2001 / *illustrated by Consie Powell* ©2001 / *nature activity by Anne M. Runyon* ©2001

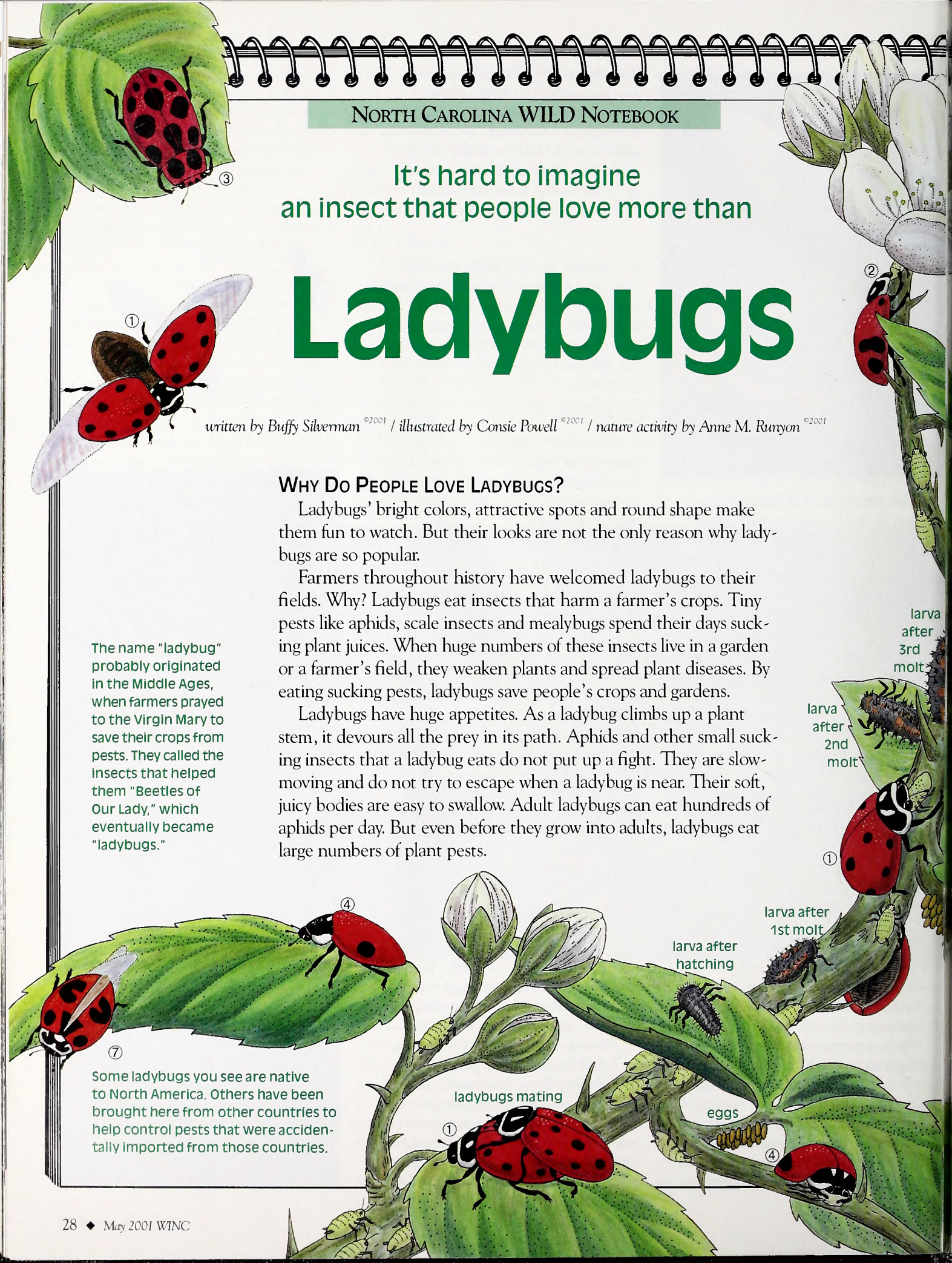
WHY DO PEOPLE LOVE LADYBUGS?

Ladybugs' bright colors, attractive spots and round shape make them fun to watch. But their looks are not the only reason why ladybugs are so popular.

Farmers throughout history have welcomed ladybugs to their fields. Why? Ladybugs eat insects that harm a farmer's crops. Tiny pests like aphids, scale insects and mealybugs spend their days sucking plant juices. When huge numbers of these insects live in a garden or a farmer's field, they weaken plants and spread plant diseases. By eating sucking pests, ladybugs save people's crops and gardens.

Ladybugs have huge appetites. As a ladybug climbs up a plant stem, it devours all the prey in its path. Aphids and other small sucking insects that a ladybug eats do not put up a fight. They are slow-moving and do not try to escape when a ladybug is near. Their soft, juicy bodies are easy to swallow. Adult ladybugs can eat hundreds of aphids per day. But even before they grow into adults, ladybugs eat large numbers of plant pests.

The name "ladybug" probably originated in the Middle Ages, when farmers prayed to the Virgin Mary to save their crops from pests. They called the insects that helped them "Beetles of Our Lady," which eventually became "ladybugs."



Some ladybugs you see are native to North America. Others have been brought here from other countries to help control pests that were accidentally imported from those countries.

LITTLE LADIES

Like all beetles, ladybugs go through **complete metamorphosis**. In late spring or early summer, female ladybugs begin to lay **eggs**. A female finds a plant that is covered with aphids or other prey. There she lays a small cluster of yellow eggs. She attaches them to a leaf or hides them on a stem. Over the next three months, a female ladybug lays as few as 20 or as many as 1,000 eggs.

Ladybug **larvae** hatch from the eggs. The larvae look nothing like their parents. They resemble tiny dark alligators walking on six legs. And they are as hungry as alligators. Over the next 20 to 30 days, a ladybug larva will eat its weight in aphids every day. As it eats, a larva grows too big for its **exoskeleton**—the hard skin covering the outside of its body. A ladybug larva sheds its skin four times while it is growing.

After it sheds its skin for the final time, a ladybug attaches itself to a leaf and becomes a **pupa**. It does not move or eat while it is a pupa. But its body is changing. It grows wings and organs it will need to mate. In 3 to 12 days, an **adult** ladybug emerges, ready to mate, fly and eat more aphids. Like all beetles, it now has hard front wings, called **elytra**, that cover its soft, flying wings.

BRIGHT COLORS

Although ladybugs hunt for a living, few animals hunt them. Why do bigger animals avoid ladybugs? They know that ladybugs taste bad.

Ladybugs have poison in their blood. When a bird or other predator attacks a ladybug, the ladybug bleeds, squirting poison on its attacker and making it sick. The predator learns that a brightly-colored ladybug is not good to eat, and avoids other brightly-colored ladybugs.

The ladybugs on these pages are native to North Carolina. They are:
① convergent lady beetle *(Hippodamia convergens)*
② confused convergent lady beetle *(Hippodamia glacialis)*
③ spotted lady beetle *(Coleomegilla maculata)*
④ two-spotted lady beetle *(Adalia bipunctata)*
⑤ nine-spotted lady beetle *(Coccinella novemnotata)*
⑥ thirteen-spotted lady beetle *(Hippodamia tredecimpunctata)*
⑦ parenthesis lady beetle *(Hippodamia parenthesis)*

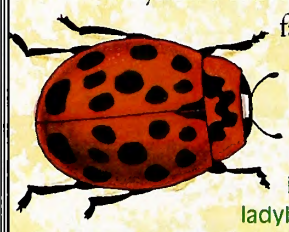
TOO MUCH OF A GOOD THING?

Have you ever seen hundreds of ladybugs crawling on the side of a house or garage in the fall? These are Asian multicolored lady beetles. Although they are not native to North Carolina, there are plenty of them living here now.

Though scientists tried for years to bring Asian ladybugs to American farms to battle aphids, the Asian ladybugs that now live here are the offspring of ladybugs that hitched a ride on an Asian freighter and landed in New Orleans. In the past 13 years, they have spread across the eastern half of the United States, and to some western states as well.

Why have these Asian ladybugs moved so fast? They devour more than 50 kinds of aphids and many other prey. They also live in more types of **habitats** than native ladybugs.

In their native habitat, Asian ladybugs spend winter huddled in cracks in light-colored cliffs. If you live in a light-colored house on a high spot, you may find them crowding on your house and crawling in through cracks around windows and doors. The Asian ladybugs do not harm people, so if you find some where you don't want them, scoop them up and put them outside under your porch or in another protected place.



When weather turns cold, insects that ladybugs eat disappear. Ladybugs prepare for winter by finding a safe place where they will be protected from wind, rain and snow. In North Carolina, ladybugs usually gather together in small groups. Occasionally a group of 300 to 400 ladybugs will crowd together under logs, leaf piles or some other sheltered spot.

What Does It Mean?

complete metamorphosis: the stages many insects go through as they develop—**egg**, **larva**, **pupa** and **adult**. The immature and adult stages can be completely different and live in different habitats.

elytra: the hard forewings which cover a beetle's thin flying wings. In ladybugs, the elytra are often brightly colored and spotted.

exoskeleton: a hard skeleton on the outside of an animal

habitat: the place where an animal or plant usually lives

Read and Find Out

- *A Ladybug's Life (Nature Upclose)* by John Himmelman, Children's Press, 1998.
- *The Ladybug (Life Cycles)* by Sabrina Crewe, Raintree/Steck-Vaughn, 1999.
- *Ladybugs* by Sylvia A. Johnson, Lerner Publications, 1983.
- *Ladybug at Orchard Avenue* by Kathleen Weidner Zoehfeld, Smithsonian's Backyard, Soundprints, 1996.
- *Ladybugology (Backyard Buddies)* by Michael Elsohn Ross, Carolrhoda, 1998.
- *What About Ladybugs?* by Celia Godkin, Little Brown and Company, 1995.

In *Wildlife in North Carolina*:

- "The Bare Bones of Skeletons" by Roger A. Powell, June 2000.

Editing and design by Consie Powell.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Color Crazy: students generalize that wildlife comes in a wide variety of colors.

Quick Frozen Critters: teaches students about predator-prey relationships, including adaptations.

Planting Animals: teaches students to describe reasons for "transplanting" animals.

Get WILD

Advanced WILD Workshops:

June 18-19 – *Fish Identification*, New River State Park, West Jefferson. Contact ASU Math & Science Center, (828) 262-3185.

October 12-13 – *Piedmont Habitats*, Blue Jay Point County Park, Raleigh. Contact Blue Jay Point, (919) 870-4330.

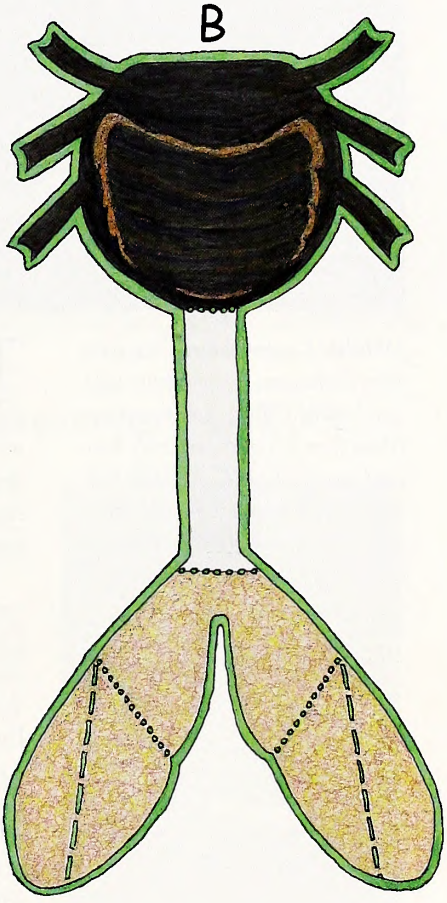
⑧

Get Outside

Look in Your Garden or Yard: Find a plant that is covered with tiny aphids. Mark the plant with colored tape or string. Now search near the aphid-covered plant for a ladybug. Return to your marked plant and release the ladybug below the aphids. Watch it crawl up and devour them. Be patient—sometimes a ladybug may crawl to the top of a plant and fly away without eating. You may need to capture several ladybugs to observe one eating aphids. Try counting the number of aphids eaten by a ladybug in five minutes. Compare how many aphids a ladybug eats at different times of the day.

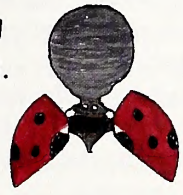
Identify Some Ladybugs: North Carolina is home to many kinds of ladybugs, both native and non-native. When you find a ladybug, use a magnifying glass to look at it very closely. Compare it to the ladybugs on these pages. Can you figure out who's who?

Ladybug Wings, a Sculpture



1. Cut out the two parts, **A** and **B**, of your ladybug, cutting along the green lines. Be sure to cut open the red wings.

2. **Part A.** Fold up along the ▭▭▭ on the red wings.



3. Fold down along the ▫▫▫▫ on the red wings.

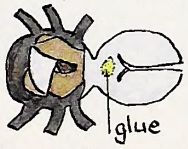
4. Fold the black belly down under the red wings, and close the wings.

5. **Part B.** Fold the white band under the black body. Next fold the brown wings back on top of the body.

6. Match the rounded back ends of part **B** to part **A** and glue together.

7. Fold each brown wing down along ▫▫▫▫ lines, and up along ▭▭▭ lines. One wing will rest on top of the other, snugly folded.

8. Put a dab of glue behind the head and press down.



9. Swing the red elytra wings forward to reveal the tucked up brown flight wings "Ladybug, Ladybug fly away home!"

Many people believe that ladybugs bring luck. Some say that when a ladybug flies away after landing on you, it takes away your problems. Others think that if you make a wish on a ladybug in your hand, your wish will come true.

The ladybugs on these pages are exotics, imported from other countries. They are:

⑧ seven-spotted lady beetle *(Coccinella septempunctata)*

⑨ Asian multicolored lady beetle *(Harmonia axyridis)*

⑩ vedalia beetle *(Rodolia cardinalis)*

Federation Honors Commissioner, Wildlife Officer, Professor

STEVEN A. WILSON

***Wildlife Commission** Chairman John Pechmann (second from left) and Master Officer Jonathan Lucas (third from left) were recently honored during the N.C. Wildlife Federation's Governor's Awards banquet. They are accompanied by Col. Roger LeQuire (far left) and Capt. Ken Craft.*

The chairman of the N.C. Wildlife Resources Commission and a wildlife enforcement officer were among the distinguished guests honored at the N.C. Wildlife Federation's Governor's Awards banquet.

For his years of voluntary service, Wildlife Commission Chairman John Pechmann received the Conservationist of the Year award. An attorney from Fayetteville, Pechmann has held a seat on the Wildlife Commission since 1993 and was elected chairman in 1999. He served as commission vice chair from 1997 to 1999 and has chaired committees on warm-water fisheries, nongame and endangered species and land acquisition.

He continues to play a vital role in assisting the Cumberland County chapter of Ducks Unlimited with a youth fishing event, held each year at the Wildlife Commission's Lake Rim Fish Hatchery. In addition to introducing 500 youngsters a year to fishing, he has helped conduct a separate, annual fishing event for children from the Falcon Children's Home, an orphanage located near Fayetteville.

Though he deeply appreciates the recognition, Pechmann downplayed his role in the commission's successes.

"The real honor has been working with our agency's dedicated staff and our other commissioners," he said. "While the chairman is uniquely situated to receive this award, it belongs to them."

Master Officer Jonathan Lucas, with the Wildlife Commission's Enforcement Division, received the N.C. Wildlife Federation 2000 Officer of the Year award. A wildlife officer since 1992, Lucas was recognized for his selfless dedication to the enforcement of wildlife laws as well as to the citizens of North Carolina. During the floods resulting from Hurricane Floyd, Lucas—who lives in Wilson—was the first officer to launch his boat into the turbulent waters, working 126 hours in two weeks to provide evacuation assistance. He was responsible for rescuing a man and his wife from the treetops as well as a homeowner who didn't want to leave his home. Witnessing a car being swept off the road, Lucas was able to reach the vehicle and pull the terrified victim out of the window.

"I want to thank the Wildlife Commission and my captain, Ken Craft, and Lt. Mark Bruton," Lucas said. "And I also want to give a special thanks to my sergeant, Jeff Hale."

Pete Bromley, a professor and wildlife extension specialist for N.C. State University, received the Wildlife Conservationist of the Year award. Having provided numerous hours of support to the Wildlife Commission, Bromley was recognized for his work with small game, research and management. At present, he is wrapping up a four-year study testing ways to increase quail populations on farms. Bromley is active with The Wildlife Society, the National Wild Turkey Federation and Quail Unlimited.

"I thank the N.C. Wildlife Federation for this honor," Bromley said. "But it really ought to be a team award because everything I do involves dedicated work of many professionals, students, landowners and citizens."

—Chris Powell

Edited by Chris Powell

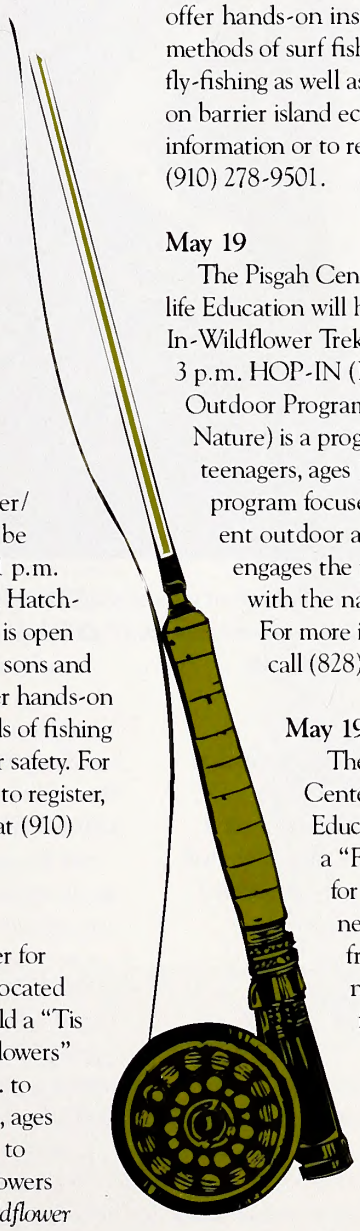
Got a Gobbler?

Call **1-800-I-GOT-ONE** to report a turkey harvest.

All bearded birds harvested during the 2001 turkey season must be reported either through a cooperator agent or via the toll-free telephone reporting system.

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.



May 12

A N.C. WILD Outdoor Skills Experience – "Mother/Child Fish Day" will be held from 9 a.m. to 1 p.m. at the Lake Rim Fish Hatchery in Fayetteville. It is open to mothers and their sons and daughters. It will offer hands-on instructional methods of fishing techniques and water safety. For more information or to register, call Jessica Brunner at (910) 425-2753.

May 12, 20

The Pisgah Center for Wildlife Education, located near Brevard, will hold a "Tis the Season for Wildflowers" program from 1 p.m. to 3:30 p.m. Beginners, ages 16 and up, will learn to identify spring wildflowers using *Newcomb's Wildflower Guide*, available for purchase at the Pisgah Center. The program will be taught by gardening specialist Helen Smith. For more information, call (828) 877-4423.

May 18-20

The N.C. Baptist Assembly, located on Oak Island, is hosting a N.C. WILD Outdoor Skills Experience – "Fishing the North Carolina Coast." The class will offer hands-on instructional methods of surf fishing, saltwater fly-fishing as well as information on barrier island ecosystems. For information or to register call (910) 278-9501.

May 19

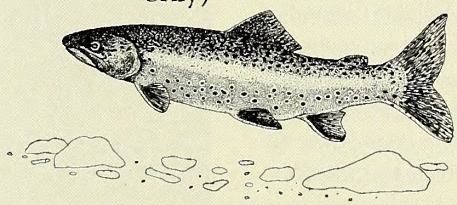
The Pisgah Center for Wildlife Education will hold a "HOP-In-Wildflower Trek" from 1 to 3 p.m. HOP-IN (Happening Outdoor Programs Involving Nature) is a program series for teenagers, ages 14 to 18. Each program focuses on a different outdoor activity that engages the participant with the natural world. For more information, call (828) 877-4423.

May 19

The Pisgah Center for Wildlife Education will hold a "Fly-Fishing for Young Beginners" program from 9 a.m. to noon. A professional fishing guide will present the basics of fly-fishing to ages 12 to 16. Casting techniques, fly-tying and aquatic ecology will be taught. Equipment is provided. Wear shoes and clothing suitable for entering the water. The fee is $5, and the class is limited to 10 people. For more information, call (828) 877-4423.

Field Notes

- Hatchery-Supported Trout Waters – Open
- Wild Trout Waters – Year-Round
- Wild Turkey – Through May 12 (bearded birds only)



Information on bag limits and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

Boating Safety Encouraged for 2001

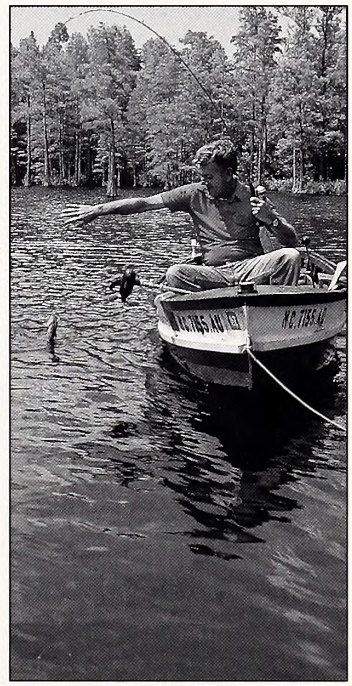
With May 19-25 recognized as National Safe Boating Week, boaters are being urged to "Boat Smart from the Start."

That National Safe Boating Council slogan particularly applies to small boat owners, who are some of the people most likely to be involved in an accident.

In addition to wearing a life jacket and having all necessary safety equipment, people in small boats should keep a low center of gravity and stay away from the edges of the boat. If an item falls overboard, maneuver the boat closer to the object instead of leaning out to grab it.

A person moving around in a small boat should maintain three points of contact, such as one hand and two feet. By learning balance and movement skills under controlled conditions, a person can enjoy hours in a small boat fishing, hunting or just cruising the waters.

—Courtesy of the National Safe Boating Council



KEN TAYLOR

***Reaching out away** from a boat can cause it to capsize if boaters aren't careful. As part of National Safe Boating Week, the National Safe Boating Council is urging boaters to "Boat Smart from the Start."*

Sutton Lake Primed for Fishing

Anglers at Sutton Lake should have better fishing as a result of a Wildlife Commission initiative to provide man-made aquatic habitat.

Last year, Wildlife Commission Fisheries Division technicians spent several days on the lake near Wilmington enhancing its shoreline. Carolina Power & Light Co., which periodically removes aquatic vegetation from Sutton Lake, requested that the Fisheries Division create additional habitat in the lake to give fish woody habitat in the absence of aquatic vegetation.

Teams of fisheries personnel armed with chainsaws and cabling equipment felled about 140 clumps of trees from the shoreline into the water. More than 350 trees were put into Sutton Lake. To keep the trees from floating free, holes were drilled in the trunks and stumps, and the fallen trees were cabled securely to the stumps remaining on the shoreline.

Despite being cleared of aquatic vegetation from Sutton Lake, fish still have habitat, and anglers still have structure to fish in the form of the felled trees.

Sutton Lake anglers have reported that fishing these newly felled trees is most productive after the leaves have deteriorated and fallen off, leaving only branches and the main trunk. In time, even the large limbs will decay leaving only submerged logs along the shoreline at which time additional trees may be cut and cabled in Sutton Lake.

—*Russell Wong*

RUSSELL WONG

***Fisheries biologists Tom Rachels and Christian Waters help** plant trees around Sutton Lake in New Hanover County. Aided by Carolina Power and Light, the Wildlife Commission planted 5,000 bald cypress trees and 2,800 water tupelo trees to benefit recreational fishing in the lake.*

Correction

In the Back Porch section of the March issue, a photo caption provided to *Wildlife in North Carolina* misidentified a member of The Wildlife Society. Second from left in the photograph is Nova J. Silvy, president of The Wildlife Society.

On Patrol

***Editor's note:** The situation below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

Wildlife Enforcement Officer Mark Cagle noticed a boat with no running lights passing under the Manns Harbor bridge in Dare County. Cagle headed to the nearest marina and located the man and his girlfriend coming back from a late-night boat ride. Reeking of alcohol, the man told the officer that he and his girlfriend had left a bar and decided to take a short boat ride before calling it a night. When the officer asked the man to perform the walk-and-turn sobriety test, he refused, saying that it was too easy. Instead, the man proceeded to do cartwheels in the parking lot. When asked to perform a breath-alcohol test, the man declined, replying that he had had lost his driver's license the month before doing that. Finally, the man tried to appeal to the officer's sense of reason saying, "All you've got is a drunk in a boat running around with no lights on." (Case closed.)

Largemouth Bass Virus Detected in North Carolina

Biologists from the N.C. Wildlife Resources Commission's Fisheries Division have detected largemouth bass virus in the Catawba, Chowan, Neuse, Cape Fear and Roanoke river drainages. The virus is not believed to have resulted in any fish kills in North Carolina.

"To date, there is no evidence that the virus is hurting bass populations in North Carolina," said Scott Van Horn, the commission's Piedmont fishery research coordinator. "As far as we know, no largemouth bass fish kills in North Carolina have ever been attributed to the virus." However, fish kills in other states, including South Carolina, have been linked to the virus.

Fish stricken with largemouth bass disease are considered safe to eat. No similar type of virus is known to affect humans, and the disease apparently does not change the flesh of infected fish.

The virus appears to attack swim bladders of largemouth bass, causing them to lose their balance. Stricken bass may appear bloated and struggle at the surface before dying. Some scientists have reported finding a yellow, cheese-like substance in the swim bladder of infected fish.

The disease appears to affect only adult largemouths heavier than 2 pounds. It typically occurs during the warmer months in summer or early fall. Because stress is believed to increase the susceptibility of a bass contracting the virus, anglers are urged to handle fish carefully when releasing them.

If a fish kill is witnessed, anglers can help by calling the Wildlife Commission at (919) 733-3633.

—Russell Wong

Wildlife Commission Approves Changes to Regulations

Changes to the deer and striped bass regulations were among the actions recently approved by the N.C. Wildlife Resources Commission for the 2001 and 2002 seasons.

One of the more significant actions taken was the retiring of the traditional Monday Opening Day for deer seasons in most of the state. The 2001 deer seasons will open on Saturdays everywhere except those counties located in the western deer season, where the season will begin on Monday, Nov. 19. Richard Hamilton, chief deputy director of the N.C. Wildlife Resources Commission, said the commission approved the changes to allow more school-age children to participate on Opening Day.

"We believe the Saturday Opening Day will help attract more youth to the sport of hunting," Hamilton said. "Recruiting young hunters will continue to be an area we address in the future."

In 2002, the Roanoke River Management Area striped bass season will no longer be regulated by proclamation. Instead, the striper season will open on March 1 and close April 15 in that portion of the river downstream from the U.S. 258 bridge near Scotland Neck. The season from the U.S. 258 bridge upstream to the Roanoke Rapids dam will be March 15 to April 30. The daily limit will be two, and the 22- to 27-inch slot limit will remain in effect after April 1. The set season should allow for more fishing opportunities, reduce congestion at boat ramps and enable fishermen to plan trips with certainty.

In other news, the commission approved listing the elk as a species of special concern. Elk were recently released in the Great Smoky Mountains National Park portion of North Carolina through efforts of the National Park Service and the Rocky Mountain Elk Foundation. Under this listing, a person convicted of killing an elk off the park can be fined up to $500, and a replacement cost for the animal can be assessed.

—Bodie McDowell

KEN TAYLOR

***Among recent** changes to the Wildlife Commission's regulations was the retiring of the traditional Monday Opening Day for deer seasons in all areas of the state, except those counties located in the western deer season.*

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through January 2001

Principal Balance
$31,972,054.24

Interest Earned
$32,289,800.60

Total Receipts
$64,261,854.84

Interest Used
$20,436,178.04

Fund Balance
$43,825,676.80

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax-deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Stocking Solutions

by Rodney Foushee

Ah, spring is in the air—warm weather and good fishing.

If you want to create a ready-made fishery on your property, now is the time to stock adult sunfish and largemouth bass in your farm pond. Plan to stock at the rate of 70 bluegills, 30 shellcrackers and 20 bass for every acre of the pond. The sunfish should be at least 3 inches long to avoid being eaten by the bass. Stocked bass should be 8 to 14 inches long.

Stocking adult fish usually costs more than stocking fingerlings, but this will provide fishing sooner. (If you prefer using fingerlings, sunfish should be stocked in the fall to give them a chance to grow before bass are stocked the following summer.)

For small ponds of less than an acre, a better option is to forgo stocking bass and instead add fingerling channel catfish and hybrid sunfish. These can be stocked in June or July, with up to 100 catfish and 300 sunfish added to the pond. These species will grow quickly when fed a commercial fish food.

For more information on managing farm ponds, contact your local Wildlife Commission district biologist or call (919) 733-3633. A list of commercial hatcheries that provide fish for stocking private ponds is available from the N.C. Department of Agriculture at (919) 733-7125.

Stocking Mountain Ponds: Spring is also a good time to stock ponds in the North Carolina mountains. However, a few more factors need to be considered.

Most pond owners in western North Carolina prefer rainbow trout, but trout are often not appropriate for small mountain ponds. Water temperatures exceeding 70 degrees F for more than a few hours can easily kill rainbow trout. This is common in many mountain ponds with low water flow during the summer. An understanding of your pond's summer water temperature and flow is critical to successful fish stocking.

In ponds that exceed 70 degrees, two options are available. Rainbow trout can be stocked in the fall when temperatures are low and then harvested the following spring before the water gets too warm. Or you can stock your ponds with warm-water species including largemouth bass, bluegills and catfish. These species prefer water temperatures between 70 and 80 degrees.

For more information on stocking mountain ponds including stocking and feeding rates and fingerling suppliers, call the state Cooperative Extension Service at (828) 456-3575.

N.C. WILD STORE

NEW!

The latest poster in our Amphibian series with the N.C. Herpetological Society

SALAMANDERS *Part 1*

Hidden along streams, in caves and under vegetation, more than 50 different species of salamanders carry out their unique life cycles in North Carolina. This first poster of a three-part set on North Carolina's salamanders features the 13 species in six families that have lungs or gills. Habitat and life cycle notes accompany a color photograph for each species. This captivating educational poster for school or home fits 24" x 36" stock frames. (The other two posters in this set will be available later this year.)

$6 ITEM CODE **P19**

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

Waterfowl Decoys of North Carolina

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34".

$10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each picture is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34".

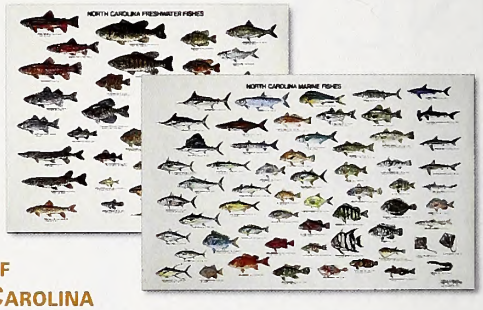
$10 ITEM CODE **P13**

Sporting Dogs of North Carolina

Pointing & Retrieving Breeds

This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. Third in the "Sporting Heritage" series. 22" x 34".

$10 ITEM CODE **P18**



Fishes of North Carolina

Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").

$10 ITEM CODE **P9**

Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. FREE with each poster set. Guide also sold separately.

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Each poster can also be purchased individually:

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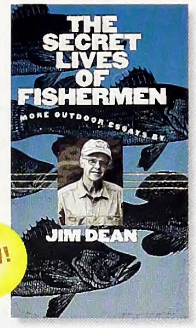

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound.
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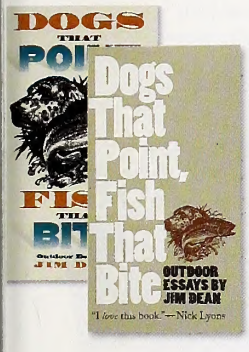

◀ Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.
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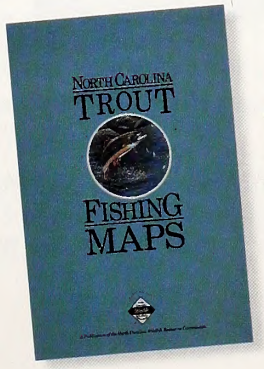

◀ North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.
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◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

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From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

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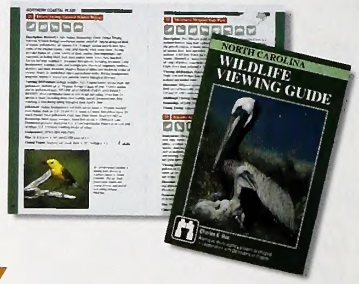

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Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

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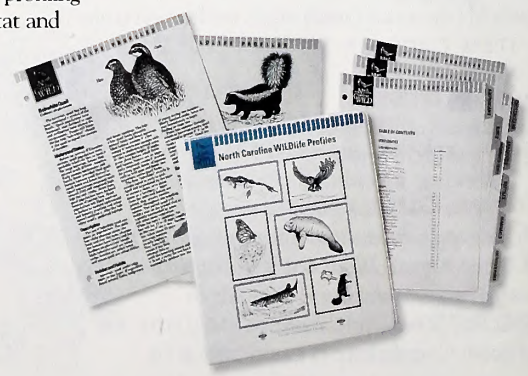


WILDLIFE COMMISSION SPOTLIGHT

Boating on the Web

The N.C. Wildlife Resources Commission recently launched a new Web page at **www.ncwildlife.org** that focuses on the agency's various programs such as fishing, boating and hunting.

The Division of Engineering Services is responsible for the boating program. This section of the Web page includes a vast amount of information that had been available only through the *N.C. Inland Fishing, Hunting and Trapping Regulations Digest*, the Wildlife Commission's customer service desk or by calling and requesting printed publications. To access the boating site, just click on the boating/waterways link located on the Wildlife Commission's home page.

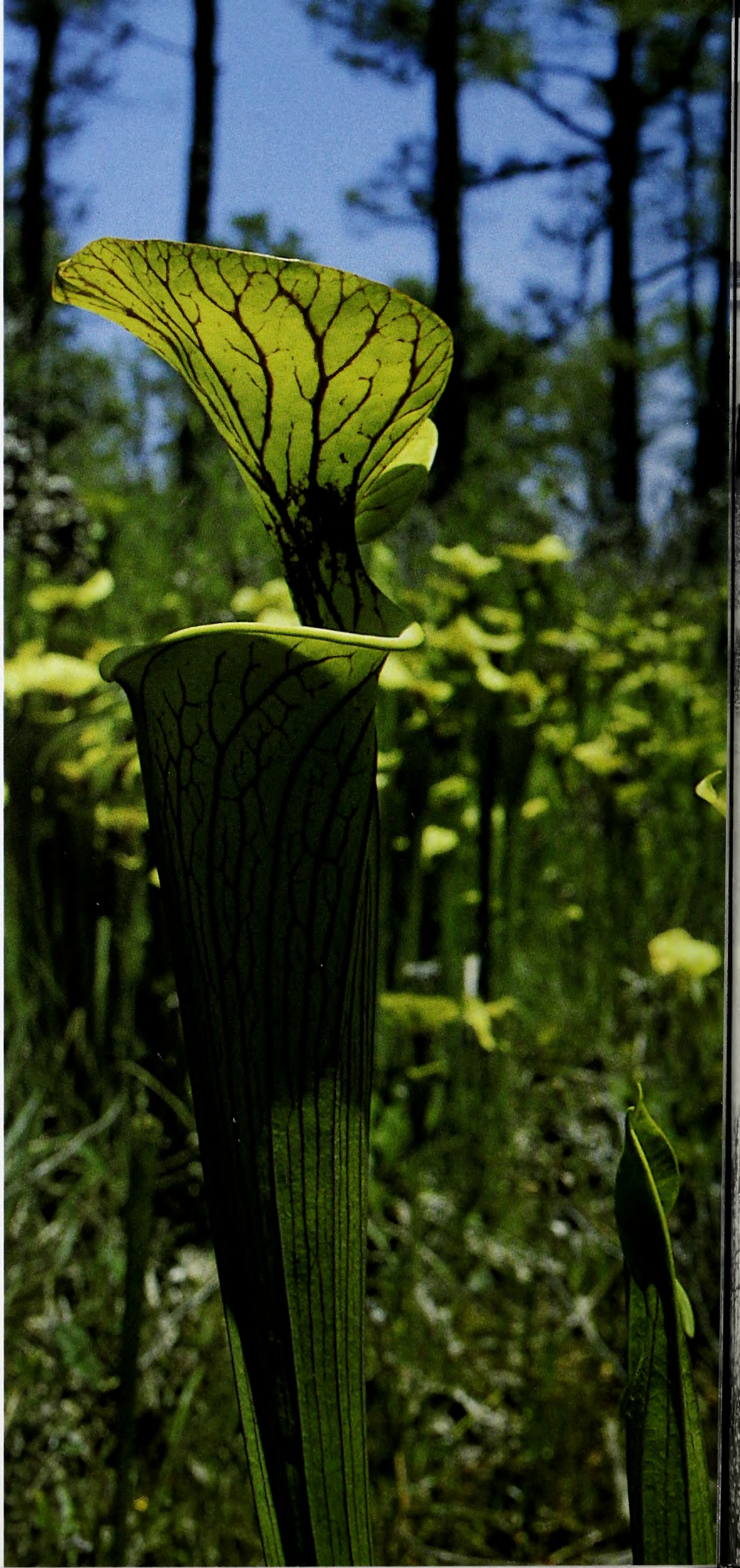
For your convenience, the *Regulations Digest* can be found online along with registration and titling forms as well as contact information. In addition, the *Vessel Operator's Guide*, new personal watercraft laws and important safety information (such as boating-education course dates and locations) can be found within the boating section.

Upper Barton Creek ramp, Falls Lake

MELISSA McGAW

Another excellent feature on the site is boating access area information. This information includes interactive maps and detailed directions by body of water and county to help boaters locate all Wildlife Commission boat ramps across the state. Visitors will also find a bulletin for announcing new boating access sites, proposals, renovations and closures. Further information can be obtained about various bodies of water including management authorities, a navigational aid guide, water quality news, a link to online tide tables and the process for establishing no-wake zones.

Additional information listed on the Web site includes a description of the N.C. Pump Out Program, boating publications, a summary of frequently asked questions and important Wildlife Commission contacts.



An Appetite for Life

The carnivorous yellow pitcher plant is just one of the many rare plants and animals found in the North Carolina Sandhills. The story begins on page 4.

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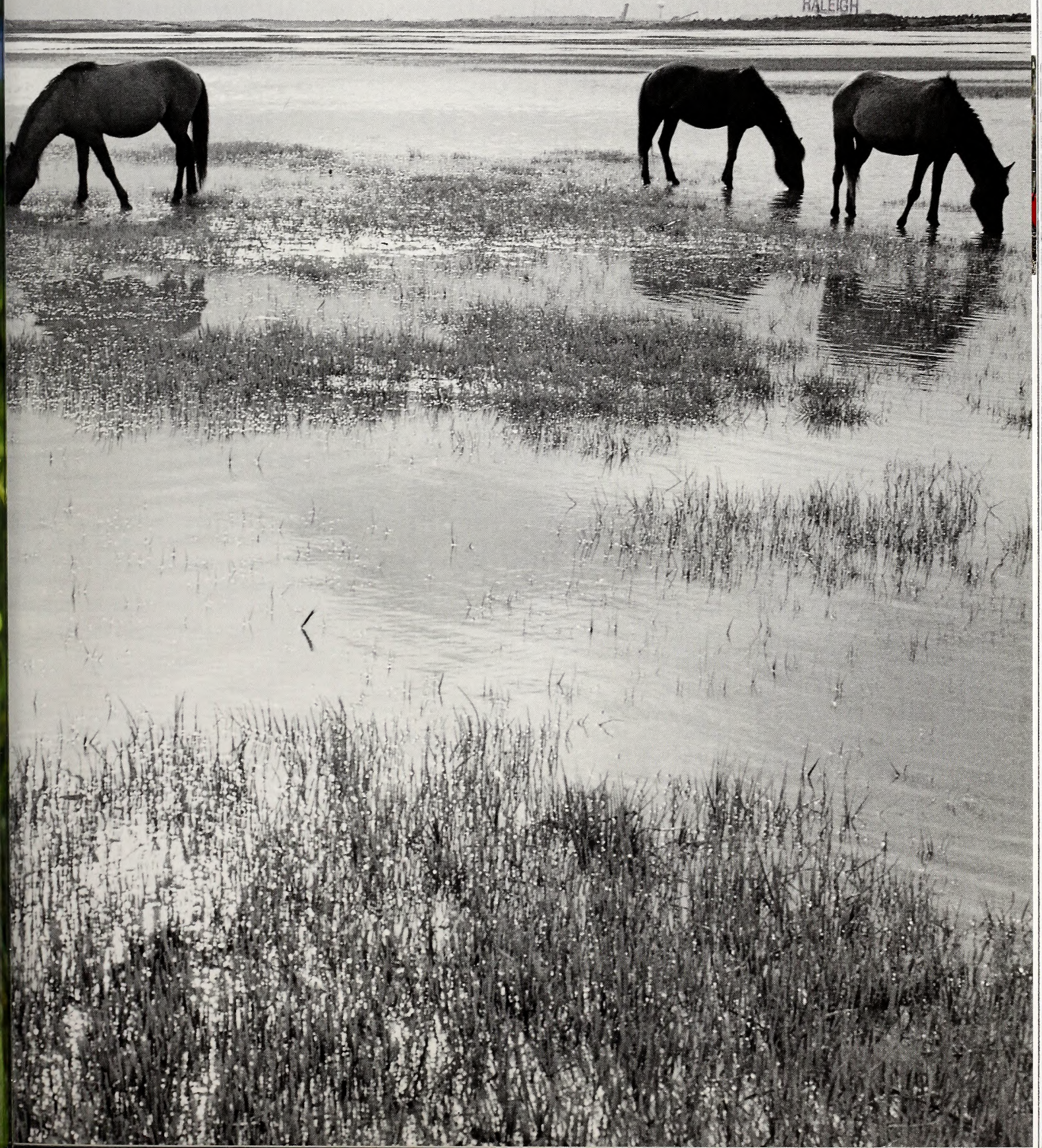

Drought and Trout

by Jim Dean ©2001

Autumn's leaves were in full flame last October when my son, Scott, and I turned onto the gravel road that leads to our favorite trout water. Those fall colors were nowhere to be seen for the next 15 miles, however. It had not rained in over a month, and we bounced along on relentless washboards trailing a thick plume of dust. The brush and trees alongside the road were caked.

"If it doesn't rain soon, they're going to have to grade everything from treetop to bedrock," remarked Scott gloomily. "And that's not the worst of it."

JIM DEAN

Through gaps in the trees, we could see a stream far below in the gorge, or what was left of it. Normally, there would have been lots of white water, but the riffles were mere trickles and the big pools were placid emeralds half their normal size.

"Yep, the fishing is going to be tough," I replied. "I used to think it was a joke to say it's so dry that you have to pick ticks off the trout you catch."

We had been hoping conditions might have improved since an earlier trip, but they were worse than ever. Our favorite streams were nearly unfishable through long stretches of normally productive water, and the trout weren't very active. Midafternoon water temperatures in some streams were approaching 80 degrees. Rather than fight the odds—and possibly stress trout we intended to release—we headed to Tennessee to fish big tailwaters where the effects of drought weren't so evident. Lots of trout fishermen I know also basically quit fishing our freestone streams after midsummer last year. And the year before, too.

Over the past three years, the drought in western North Carolina has become so severe that rainfall in many areas is more than 30 inches below normal. The outlook for the current season seemed no better as late as opening day in April. Streams were still abnormally low at a time when they are usually running high from winter and spring rains. Many fishermen are concerned that the prolonged drought may be taking a toll on trout populations. Yet, although fishing opportunities have surely been impaired, fisheries biologists believe the trout will survive.

"I used to think it was a joke to say it's so dry that you have to pick ticks off the trout you catch."

"So far, we haven't seen any mortality in wild trout that we could directly attribute to drought," said Mallory Martin, mountain regional fisheries supervisor for the N.C. Wildlife Resources Commission. "Wild adult trout are pretty well adapted to survive long periods of low water. They will move to find cover and cooler tributaries or spring holes, but that's not to say there haven't been some adverse impacts that could show up later. Low water makes trout more vulnerable to predators. Also, extreme low water could dry up prime spawning and nursery sites, and any loss of young trout might not be noticeable for a couple of years."

During the past 10 years, Wildlife Commission biologists have accumulated good data on wild trout populations, and they've found that it's fairly normal to see considerable fluctuation in populations from year to year as a result of environmental influences. "There's not much we can do to alleviate stream conditions, but fortunately wild trout are pretty resilient," explained Martin. "We've got more flexibility in operating our hatcheries to ensure that trout production quotas are met."

Major improvements have been made at Armstrong Hatchery to increase production for the next 20 to 30 years. Also, at Pisgah and Armstrong hatcheries, new liquid-oxygen systems are helping oxygenate water when flows are diminished. Stocking can also be delayed, as it was last year, until stream conditions improve.

Meanwhile, trout fishermen can avoid stressing fish by taking extra care in playing and handling trout. Avoid using overly light tippets that may require you to play a fish too long (it's seldom necessary to use a tippet lighter than 5X, even in low, clear water). It's also rarely necessary to touch a trout or remove it from the water if you use forceps to twist the hook free quickly, especially if you use barbless hooks.

This year, you might also want to give your favorite wild trout streams a break and fish some of the popular delayed harvest streams. Trout are stocked each spring, but they must be released until later in the season when normal creel limits are permitted. Because these streams contain mostly stocked fish, there's no risk to wild trout populations.

Other than that, we can only hope for the best. And do a little rain dance.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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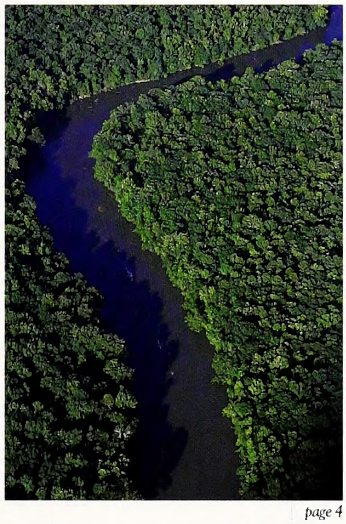

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The Catalpa and the Caterpillar

written by Clyde E. Sorenson©2001
illustrated by David Williams

It all starts innocently enough: the first sign of the impending devastation of the catalpa tree is just a small, brown patch on a single leaf. You have to look hard to find those responsible for the damage—a tight knot of tiny, pale-green caterpillars, each adorned with a fearsome-looking, but harmless, horn on its tail, huddled on the underside of the leaf. Viewed from below, they are very hard to see, camouflaged by their color and the translucent leaf around them. It's hard to believe that in about 10 days, these innocuous little denizens and their kin will completely defoliate this catalpa tree growing in my back yard.

The caterpillars are the larvae of a sphinx or hawk moth. The larvae, when they get large, have a well-deserved reputation as one of the finest fish baits going; I'd hazard a guess that a sizable share of the catalpa trees dotting our state's landscape were planted by anglers with designs to grow bait (that's why I planted mine). The relationship between these little caterpillars and their host tree is quite intriguing; it is a classic example of an ecological phenomenon called co-evolution. The catalpa tree and the caterpillars have been at "war" for thousands of years, and both have developed strategies for dealing with each other.

The tree, for its part, mounts some formidable defenses against insects that would feed on its leaves. The foliage is laced with a witch's brew of chemicals. Tannins and related chemicals (the materials that put the "pucker" in green persimmons and acorn meats) may constitute as much as 15 percent of the dry weight of the foliage. Many tree species protect themselves with tannins, though, and many herbivores have figured out how to deal with them. Catalpa trees have a little something extra—virtually every part of the tree also contains potent chemicals called alkaloids (alkaloids include substances such as caffeine and nicotine). The alkaloids in catalpa trees are unique, and they are so toxic that the vast majority of herbivores simply can't eat catalpa. These chemicals even protect catapla-wood fence posts from termites and other wood-feeding organisms.

The only insects with chewing mouthparts that routinely use catalpa foliage as food are the catalpa sphinx caterpillars, and these leaves are the only things they will eat. They have evolved ways to cope with, and even exploit, the chemical defenses. The alkaloids are stored in the larvae's blood, or hemolymph. As the caterpillars grow, the concentration of the alkaloids in their hemolymph increases. Not coincidentally, the coloration of the caterpillars changes as they grow older; they change from that highly camouflaged pale green in their first two larval stages, to black spotted in their third stage, to boldly marked with conspicuous black or white stripes in the last two larval stages. The caterpillars get more toxic as they age, and those flashy markings advertise that fact to potential predators.

The warning colors that large larvae display work for most—but not all—of the potential natural enemies of the caterpillars. At least one bird, the yellow-billed cuckoo, appears to have found a way around that toxic blood. I once watched a cuckoo mash individual caterpillars from one end to the other, then vigorously shake them; the hemolymph flew off like green raindrops, and the bird gobbled down what was left.

The tree recruits caterpillar assassins by offering nectar in little glands at the bases of the leaf veins. These nectaries attract yellow jackets and other predaceous wasps. More important, the nectaries also feed tiny parasitic wasps whose larvae sometimes kill more than 80 percent of catalpa caterpillars.

The tight aggregations of very young caterpillars rarely remain on a single leaf long enough to devour it completely. Some trees rapidly shed leaves fed on by caterpillars, so perhaps the larvae move to avoid being cast off by the plant. The tree's final adaptation to the annual onslaught of caterpillars is endurance. Unlike many other trees, catalpas are remarkably tolerant of defoliation and often will produce three flushes of leaves over a growing season.

This summer, should you have the opportunity to thread a fat catalpa worm onto a No. 10 long-shanked hook and drop it into a local pond, think about the finely tuned relationship between that caterpillar and the tree you plucked it from. Then, look around. There are a thousand other equally fascinating relationships surrounding you.

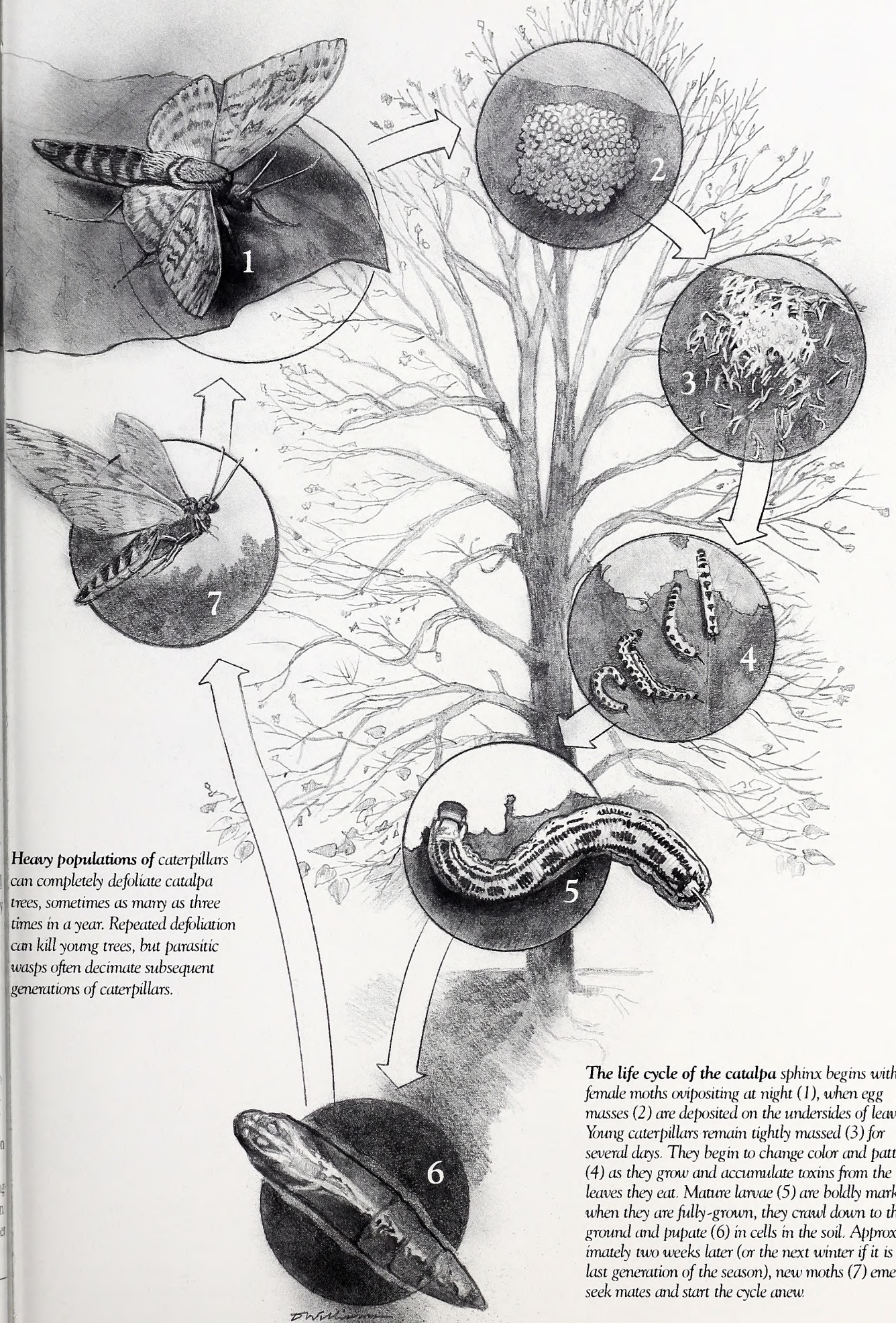
Clyde E. Sorenson is an assistant professor of entomology at North Carolina State University.

Other Reading:

- Hodges, R. W. in Dominick, R. B. et al., *The Moths of America North of Mexico* (E. W. Classey Limited and R. B. D. Publications Inc., 1971).
- Covell Jr., C. V., *A Field Guide to the Moths of Eastern North America* (Houghton Mifflin Company, 1984).
- Baker, W. L., *Eastern Forest Insects* (U. S. Department of Agriculture, Forest Service, 1972).

Surfing the Web

- For a brief description of the catalpa sphinx caterpillar, *Address:* http://www. ext.vt.edu/departments/entomology/factsheets/catspcat.html
- For photographs of the various life stages of the catalpa sphinx, *Address:* http://www.ag.auburn.edu/dept/ent/bulletins/catalpasphinx/catalpasphinx.htm



***Heavy populations of** caterpillars can completely defoliate catalpa trees, sometimes as many as three times in a year. Repeated defoliation can kill young trees, but parasitic wasps often decimate subsequent generations of caterpillars.*

***The life cycle of the catalpa** sphinx begins with female moths ovipositing at night (1), when egg masses (2) are deposited on the undersides of leaves. Young caterpillars remain tightly massed (3) for several days. They begin to change color and pattern (4) as they grow and accumulate toxins from the leaves they eat. Mature larvae (5) are boldly marked; when they are fully-grown, they crawl down to the ground and pupate (6) in cells in the soil. Approximately two weeks later (or the next winter if it is the last generation of the season), new moths (7) emerge, seek mates and start the cycle anew.*

Roanoke River Incorporated

written by Chris Powell
photographed by Melissa McGaw © 2001

A COMPANY'S PLAN TO OPERATE BARGES ON THE ROANOKE RIVER WAS RECENTLY CANCELED AFTER MEETING INTENSE PUBLIC CRITICISM. BUT WILL THAT SENTIMENT BE ENOUGH TO CONTINUE PROTECTING ONE OF OUR LAST GREAT RIVERS?

HOW MUCH IS A RIVER WORTH? That is the question North Carolinians are asking themselves as industries continue to seek sites along our waterways. What was true 100 years ago is still true today. Most of our present-day cities and towns originally developed around businesses that needed access to some type of water. But does a modern-day, multimillion-dollar plant justify compromising a river? And aesthetics aside, is it truly good business for this state? An industry may stimulate a local economy over a half-century or more, but how does that compare to the economic engine of a river that operates through eons? In a country that lives by supply and demand, the fact is no one is making any more rivers. That point is not lost on Joe Albea or Tom Earnhardt, two outdoor enthusiasts devoted to protecting North Carolina's waterways.

"Fish on," says Joe, as he proceeds to reel in another hickory shad that slashes and jumps across the surface of the Roanoke River. Anchored a short distance away, his buddy Tom and Tom's 9-year-old son, Izaak, aren't off to quite as fast a start. Joe can't resist a teasing offer to toss them one of his brightly colored shad darts. A devout fly-fisherman, Tom will have none of that and proceeds to whip his hand-tied creation out across the water. "I believe this one's a 5-pounder," Tom jokes back, retrieving his first hickory of the morning. After a couple hours of laughing and kidding, everyone involved has caught and released a number of shad, including more than one citation-sized fish.

Tom Earnhardt and son, *Izaak, enjoy a day of shad fishing on the Roanoke River. As shown in an aerial photo on the facing page, the river has one of the largest intact river corridors in the state.*

The two friends are in particularly good moods this morning, and it's not just because of the amazing shad run. Joe, producer of an outdoor television show in Greenville, and Tom, an attorney, writer and retired law professor from Raleigh, have been waging a never-ending campaign to protect the Roanoke and other rivers of the state. The two men recently raised enough awareness statewide to convince DFI Group Inc.—a company that plans to build an

"They basically wanted to turn the 18 miles of the river from the mouth to Jamesville into a barge canal."

–Joe Albea

Tom Earnhardt weighs *one of many citation-sized hickory shad that were caught on a section of the Roanoke just below Weldon. Miles of flooded swamps (below) border the Roanoke, providing for a rich diversity of wildlife.*

ethanol plant near Jamesville in Martin County—to abandon a plan to operate barges on the lower portion of the Roanoke. A number of environmental conservation organizations, including the N.C. Wildlife Resources Commission, had feared that the tugboats needed to push the 100-foot barges would stir up deadly chemicals deposited by previous industries into the river's bottom. Joe and Tom's main worry was that the plume of sediment would contaminate fish trying to move up- or downstream. They were also concerned about possible ethanol spills that could wipe out the river's ecosystem, as well as dangerous wakes caused by the enormous vessels.

"They basically wanted to turn the 18 miles of the river from the mouth to Jamesville into a barge canal," Albea said. "That is public-trust waters—waters that are owned by every person in North Carolina."

A statewide effort quickly rallied support from a number of fishing and conservation groups totaling 15,000 people. The ethanol plant could proceed, they said collectively, but barging the river was out of the question. The proposed plant along with a barging dock appeared to be rapidly heading toward government approval. But the public groundswell rising in opposition was picked up by the media, which attracted the attention of decision-makers in Raleigh. A few weeks later, DFI officials announced that they would seek a full environmental impact statement for the plant and eliminate any plans to use barges.

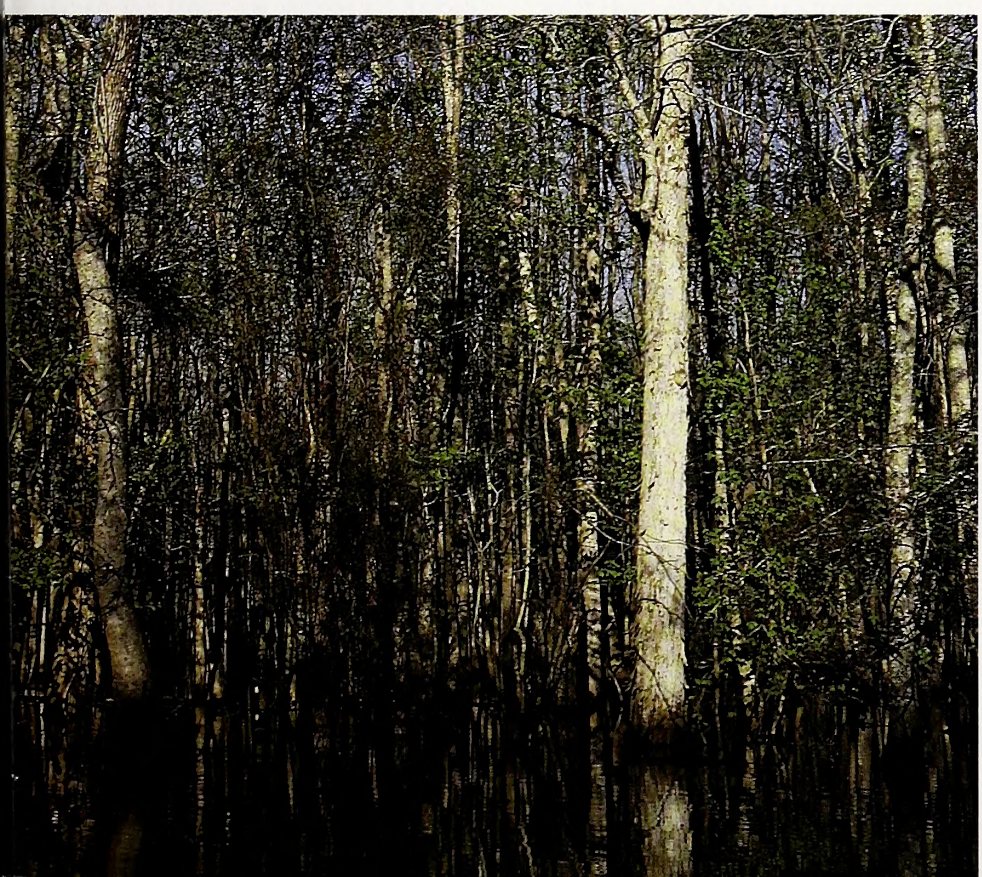
"We didn't cause those materials to be in the river sediment, but it clearly impacted us," said Rann Carpenter, who until recently was the vice president of governmental affairs with DFI. "We continued to hear the concerns raised, and we started to ask whether there were alternatives whereby we could site a facility in Martin County and not use the river and barge traffic."

KEN TAYLOR

If approved, *DFI Group Inc.'s ethanol plant will be located a mile east of Jamesville on 80 acres. The plant could be completed in about three years and would produce 30 million gallons of ethanol a year.*

If it survives the permitting process, the plant could be completed in about three years and will be located on what is now farmland adjacent to the river. The company also plans to build two other plants in eastern North Carolina, and one of those, it says, will have to include barging. But to its credit, DFI is willing to sacrifice some of its bottom line to do the environmentally right thing for the Roanoke. Barges would have provided a cheap means of transporting the bulk raw materials needed to run the facility. Instead, the more expensive alternatives of truck and railroad will be used to haul corn, and a pipeline will be used to convey natural gas. The company has also agreed to move the site of the plant off the Roanoke and to grant a conservation easement along the river's edge, where trees will be allowed to remain.

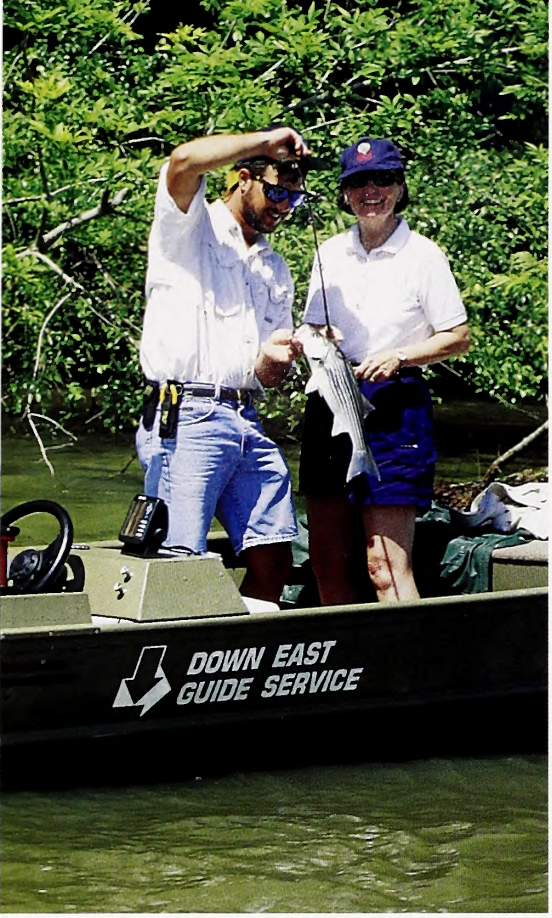
In fact, it would be unfair to stereotype DFI as a corporation willing to put profit above any environmental concerns. Known for its clean operation, an ethanol plant is really nothing more than a high-tech moonshiner's still. Ethanol is made by distilling corn into an alcohol form that is sold as a fuel additive. Ethanol allows for cleaner-burning gasoline that limits automotive emissions and reduces oil consumption. The main byproduct of the distilling process, corn mash, can be dried and sold as livestock feed. Added to that is DFI's promise to purchase corn mainly from farmers around Martin County. And though this is in the developmental phase, the company one day hopes to use industrial sweet potatoes to produce ethanol. This could create a new market in eastern North Carolina for sweet potatoes, which could be grown on former tobacco land.



Anything that keeps farmers in business has to be viewed as an environmental plus for a state experiencing unprecedented sprawl. But the additional jobs, the arrival of piped natural gas and the $900,000 the plant will pay to the county in annual taxes are the most appealing aspects to residents of economically depressed Martin County. Steve Wolfe, a member of the Coastal Federation Board of Directors, and an owner of property adjacent to the proposed plant, said the public opinion is mostly positive among county residents.

"Ethanol is a very simple industry, and the newer plants are relatively clean," Wolfe said. "Most people are kind of looking forward to it as far as another 70 jobs, and I think there is some general relief that they are not going to discharge into the river."

For now, the end result appears to be a win-win situation for everyone. But Tom, Joe and others are perplexed as to why they have to keep fighting the same old battles to protect what is obviously a state treasure. In 1999 the two, working with several concerned fishing and conservation groups, took on Wisconsin Tissue, which had planned to build a controversial paper-recycling plant on the Roanoke River near Weldon. The plant's proposed location near traditional striped



KEN TAYLOR

***Though it's hard to** put a price on a healthy river, striped bass alone generate hundreds of thousands of dollars along the Roanoke, which in turn help local stores, motels and guides such as George Beckwith (above). In addition to a healthy striper population, rich bottomlands (opposite bottom) along the river support an array of wildlife species including wild turkeys, bears and neotropical migratory birds such as the prothonotary warbler (below).*

"They are betting the future of an entire ecosystem on a few jobs.

bass spawning grounds met with intense criticism from environmental organizations. The situation was ultimately resolved when Georgia-Pacific Corp. purchased Wisconsin Tissue and concluded that it didn't need a production facility located on the Roanoke. Following that episode, Joe and Tom believed public sentiment regarding the river would be enough to keep harmful industrial practices away, but that has not been the case.

One of Tom's biggest arguments is this: It simply is not sound business judgment to gamble the health of a river against a company that will bring in a limited number of jobs. He believes officials recruiting an industry to North Carolina should first meet with environmental permitting agencies and organizations to determine if the plan is acceptable. "I think it's embarrassing for the state to recruit these industries and then have a number of groups come out against them," Tom said. "They are betting the future of an entire ecosystem on a few jobs. And I think the people making the decisions don't always know what the stakes are."

Those stakes are a river that is a virtual industry unto itself. In 1998 the Wildlife Resources Commission conducted a survey to determine how much money the Roanoke striped bass fishery alone generates annually. Fisheries biologists handed out questionnaires to 1,800 fishermen, asking how much they spent on gas, bait, food and lodging to fish for stripers. According to the results, Roanoke River anglers spent approximately $918,000 on fishing trips during 75 days of the 1998 striped bass season. When asked how much more they would have been willing to pay for their trips, the fishermen indicated they would have paid an additional $800,000.

Pete Kornegay, fishery research coordinator for the Wildlife Commission, said that the purpose of the study was to inform people how important monetarily a healthy river is.

"We want people who make decisions that could potentially affect the fisheries to know that these resources are not without value to their local economies," Kornegay said. "Although not included in that study, these striped bass migrate into the Albemarle and Pamlico sounds, where both recreational and commercial fisheries occur. This helps boost economies in many North Carolina counties."

The study's figures didn't include the other three-quarters of the year, when people are bass fishing, hunting or simply pleasure boating on the Roanoke. Also, you can't exclude the revenue generated year-round from sporting goods stores, marinas, motels, restaurants, boat dealers and gas stations... and the list goes on.

In the past decade, the Roanoke River's striper and shad fisheries have garnered national attention, with anglers traveling from all parts of the country to experience them. Yet it hasn't always been that way. When a series of dams was built on the river between 1953 and 1963, water flows were restricted, which resulted in concentrated pollution and insufficient water flows for spawning stripers. However, a series of events reversed the trend. The pulp mills built settling reservoirs to remove some waste and enacted other procedures to reduce pollution. The U.S. Army Corps of Engineers and a private power company agreed to release enough water from the dams to mimic seasonal flows more conducive to spawning. Finally, commercial netting was outlawed, and strict size and creel limits were placed on recreational

F. EUGENE HESTER

And I think the people making the decisions don't always know what the stakes are."

–Tom Earnhardt

anglers. Since that time, the water has cleared, and the striper population has fully recovered along with a hickory shad run that is one of the largest on the East Coast. So the river is not just a steady generator of money and resources. Its benefits are also in a growth trend.

In addition, the Roanoke's floodplain is considered to be one of the most diverse ecosystems in the mid-Atlantic states. Through the collective efforts of The Nature Conservancy, the U.S. Fish and Wildlife Service and the Wildlife Resources Commission, more than 34,000 acres of the Roanoke floodplain have been brought into conservation ownership. Included in that is the 18,500-acre Roanoke River National Wildlife Refuge. And with 21,000 acres of Georgia-Pacific timberland under conservation management, a continuous forested corridor stretches from Hamilton to the Albemarle Sound. The woodlands and swamps are home to deer, turkeys, black bears, raptors, waterfowl, snakes and too many other creatures to count. The flood plain along the river is 150,000 acres, parts of which contain cypress trees over 1,000 years old.

Both Tom and Joe want to make it clear that they are not opposed to industry. As a professor who taught corporate law for many years, Tom knows firsthand the type of prosperity industries can bring to an area. But among other things, he believes companies ultimately decide to relocate to North Carolina because of our clean rivers, sounds, beaches and quality of life. Why, he wonders, would we want to risk the proverbial goose laying the golden egg? Maybe the answer is that we should start thinking of the river as a business—a Roanoke River Inc., if you will. But what a shame it is to have to value a river in terms of dollars and cents. Especially when we know that its true benefits are found in flashing fish, sparkling waters and laughing anglers. Those things are priceless. ⊠

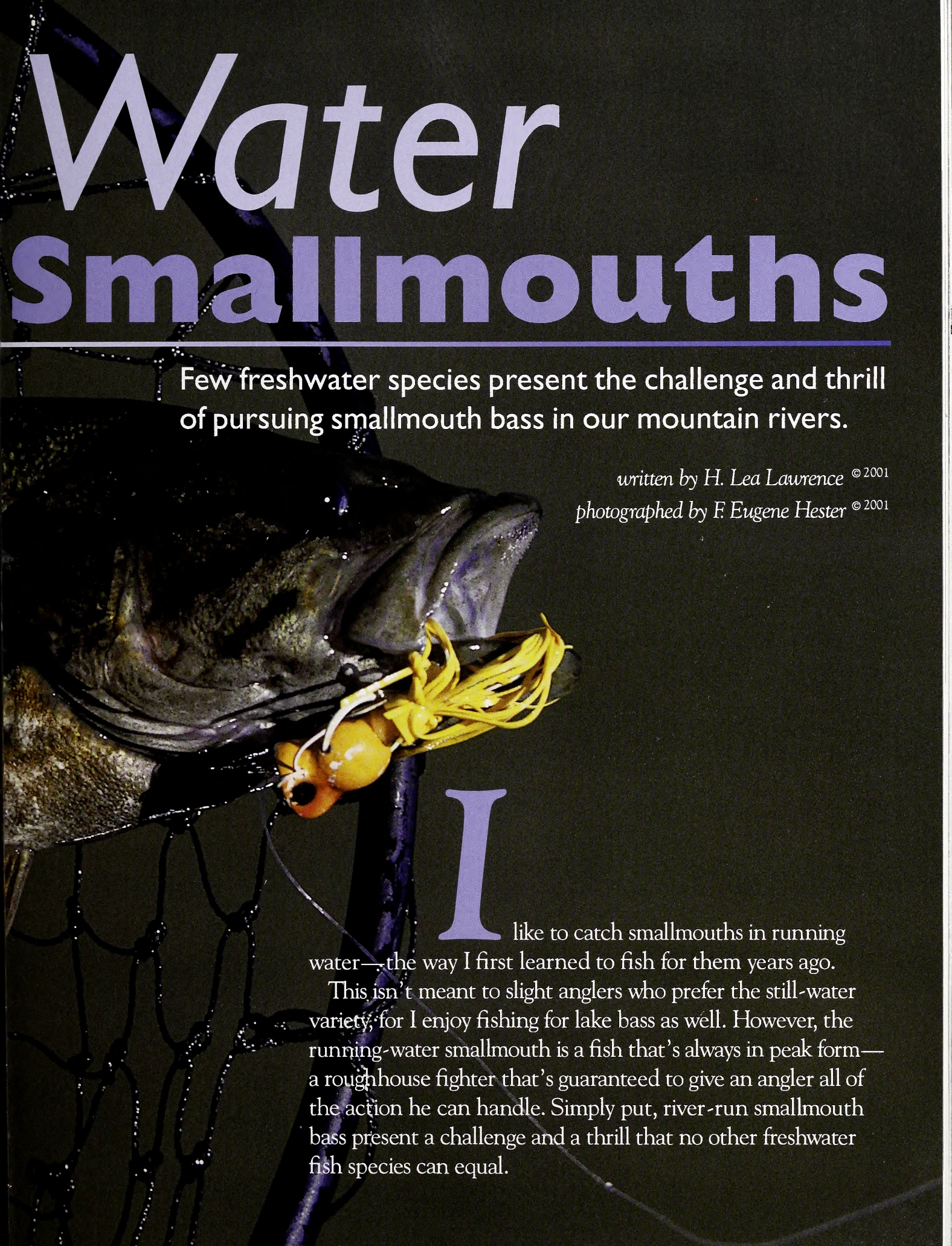
***Joe Albea (left) and** Tom Earnhardt take a break after a morning of fishing. The two men have devoted much of their spare time to raising public awareness about the necessity of clean waterways in North Carolina.*

Running

Water Smallmouths

Few freshwater species present the challenge and thrill of pursuing smallmouth bass in our mountain rivers.

written by H. Lea Lawrence © 2001
photographed by F. Eugene Hester © 2001



I like to catch smallmouths in running water—the way I first learned to fish for them years ago.

This isn't meant to slight anglers who prefer the still-water variety, for I enjoy fishing for lake bass as well. However, the running-water smallmouth is a fish that's always in peak form—a roughhouse fighter that's guaranteed to give an angler all of the action he can handle. Simply put, river-run smallmouth bass present a challenge and a thrill that no other freshwater fish species can equal.

Possibly part of my bias can be attributed to the fact that I was introduced to this classy bass species in the streams and rivers that flow through the mountains of western North Carolina. It happened when I was about 10 years old. The scene was the Oconaluftee River near Cherokee, and the prize was a smallmouth that might possibly have reached the 1-pound mark. In my young eyes, it was a giant. At that point I was more full-hooked than the bass, and the die was cast. Running-water smallmouths became my main quest.

Over the years my horizons broadened, and I had the opportunity to seek these bronze battlers in many prime waters throughout North America. But given my preference, I'll take the mountain-bred variety every time!

The smallmouth in running water is a fish that, once hooked, is a no-holds-barred scrapper. It strikes like a thunderbolt, and makes sizzling runs and flashing leaps that can leave an angler awed.

This is a plus, but there's also a minus. River smallies can be extremely unpredictable, and those fishermen who've dealt with them know what I mean. Like brown trout, smallmouths can often be extremely finicky and virtually impossible to coax into striking. And sometimes what appears to be highly prospective water can seem as barren as an unstocked farm pond. I've had smallmouths ignore lures presented in riffles and shoals, then do a turnabout and swat a surface lure in a calm, slow-moving stretch of water where they shouldn't have been holding. That's where having an open mind and experimenting with various lures and techniques can make the difference between success and failure.

Casting, spinning and fly-fishing gear are all suitable for stream and river smallmouths, but I get the best results fishing with an ultralight spinning outfit. Light line and tiny lures allow me to cast into places that would be difficult to reach with other kinds of gear. Most important, though, I feel like I get the maximum amount of pleasure from every fish I catch, regardless of its size. Which reminds me of something that's well worth thinking about. Few running-water smallmouths reach what some fishermen consider to be trophy size; in fact, not many ever top the 4-pound mark. Still, taking them on ultralight tackle with 4-pound test line is just as challenging and exciting as catching much larger fish with casting gear and heavy line.

Of course, having cut my teeth on mountain trout with a fly rod, there are certain times when I can't resist reverting to that approach.

The basic principles of fishing for running-water smallmouths are quite easy to comprehend. The fish's main food is crayfish, but there are important runners-up,

***Running water—a** swift riffle (right) or calmer stretch (left)—provides good fishing for smallmouth bass. Mountain smallies are notoriously finicky, but the thrill of landing one of these battlers can make the frustration worthwhile.*

including salamanders and minnows. Lagging close behind are a variety of other critters, with hellgrammites leading the pack, followed by frogs, small snakes and virtually anything else that falls into the water and tries to swim for it—such as grasshoppers, crickets and even mice.

Fishing shoals and riffles usually calls for lures that resemble crayfish or minnows. Here are several that have been very dependable producers for me: Rebel's Teeny Crawfish, the A-C Shiner, Norman's Tiny N and Luhr Jensen's Hot Shot. River smallmouths like little lures, and with ultralight spinning gear, you'll have no trouble casting lures as small as 1/16 ounce.

I also like the little crystal and hammered-silver-and-copper spoons, as well as ones with yellow, orange and green color combinations. Smallmouths are fond of yellows and oranges, and at times green seems to turn them on too. As for ultralight spinners for smallies, Rooster Tails and Mepps have both been very productive for me.

When it comes to fly rods, my arsenal of flies is fairly simple—an assortment of streamers, streamer-spinner combinations, hair bugs and cork-body popping bugs. A 9-foot rod with a forward- or rocket-taper line is my tackle of choice for fly-fishing.

Something else: There are times when surface offerings work well in fast water. I've had excellent success working injured-minnow lures and small poppers in fast-moving water. A lively action will bring the fish up at times, even when the lure is traveling past pretty rapidly.

Naturally, I don't ignore pools, because sometimes they can be the best bet, especially when probed with a small brown or green, weedless jig. Hopping the jig on the bottom near submerged boulders and rocks can often produce smallmouths. But I prefer to start in fast water. That's the one place smallies can always be found.

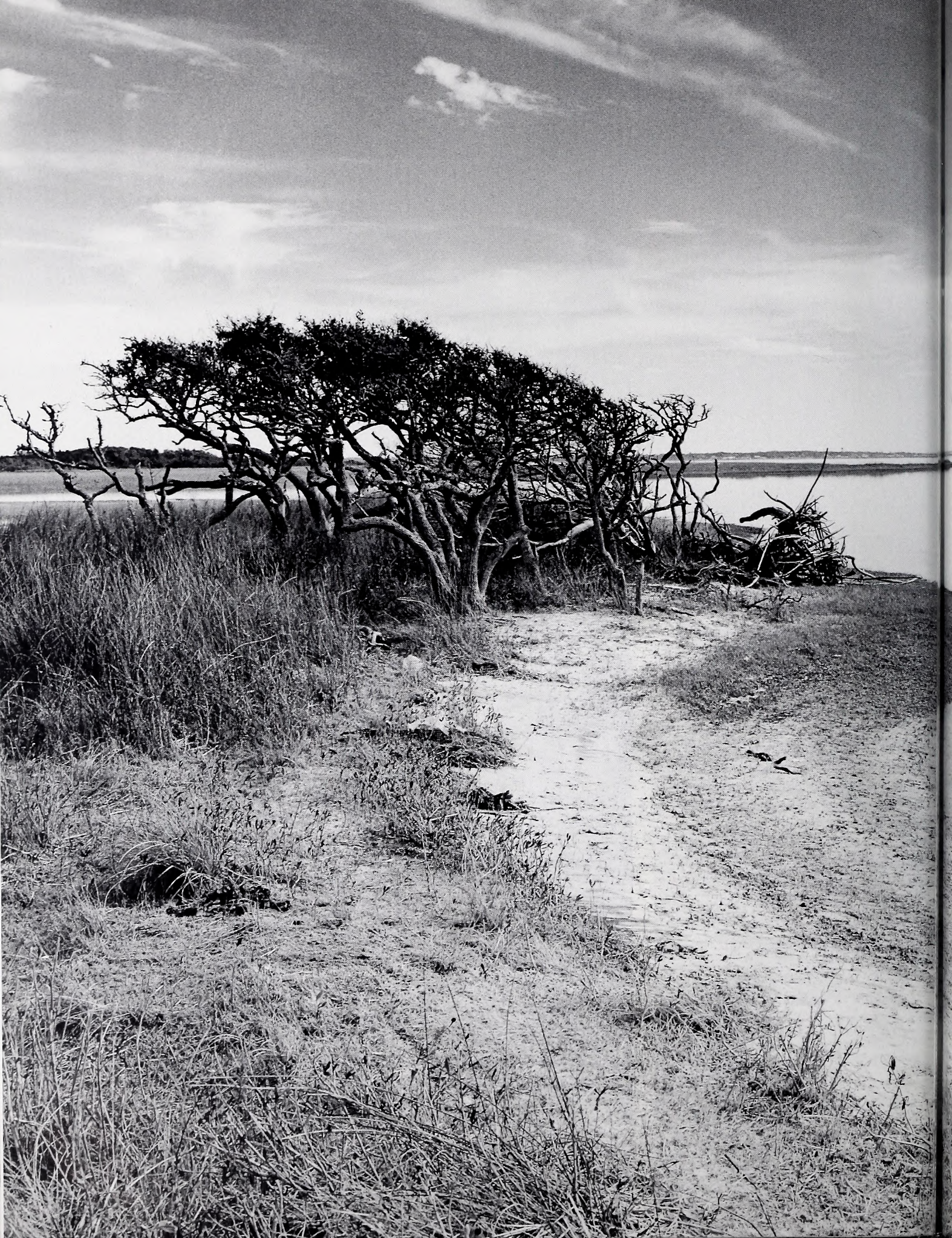
Note that I said "found," not caught! ⊠

Good Bets for River Smallmouths

Tar Heel anglers don't have to look far for good smallmouth fishing because the North Carolina mountains probably have as many excellent smallmouth rivers and streams as any place in the nation. The fish range greatly in size and length. And they can be found in waters that can be floated in canoes and flat-bottomed aluminum boats to ones where wading is the only option. Here's a list of some of the best choices:

- French Broad River, downstream from the Asheville airport
- New River, lower section of the North Fork, and South Fork downstream from U.S. 221 bridge
- Toe River, downstream from Spruce Pine
- Nolichucky River, downstream from U.S. 19W bridge near Sioux
- Tuckasegee River, downstream from the dam at Dillsboro
- Little Tennessee River, downstream from Franklin
- Catawba River, lower few miles before emptying into Lake James
- Linville River, lower few miles before emptying into Lake James
- Yadkin River, downstream from Patterson
- Oconaluftee River, downstream from Cherokee
- Hiwassee River, lower portion before reaching Hiwassee Lake
- Watauga River, downstream from Deep Gap
- Cheoah River, lower few miles before reaching the headwaters of Calderwood Lake

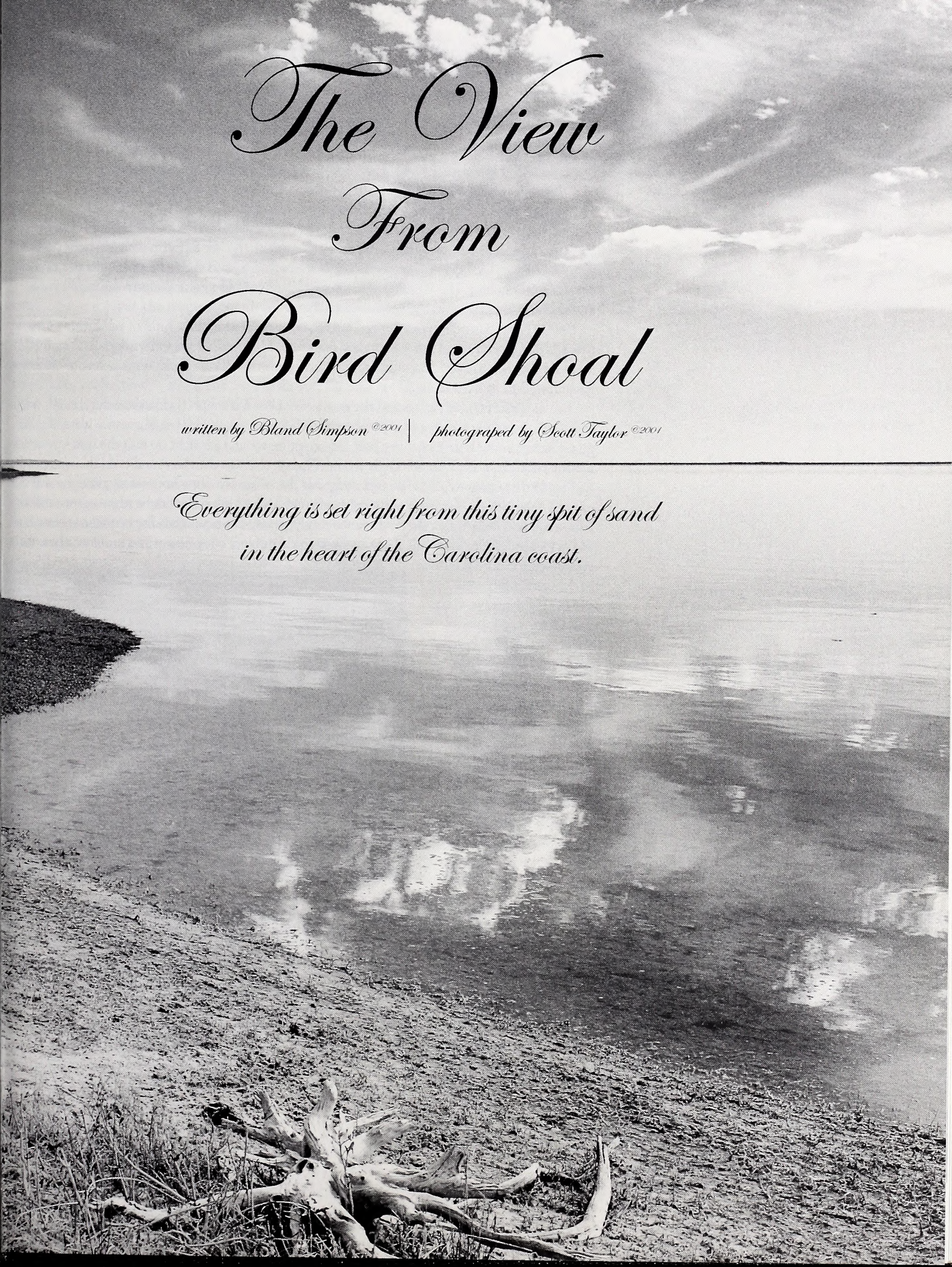
One of the special advantages of these mountain waters is that they remain cool, if not actually cold, throughout the summer, so there are no doldrums like those typically encountered with summer fishing in the Piedmont and Coastal Plain. And if there's a formula for the kind of water that produces the highest quality smallmouths, it's expressed with three C's—clear, clean and cold.



The View From Bird Shoal

written by Bland Simpson ©2001 | photographed by Scott Taylor ©2001

Everything is set right from this tiny spit of sand in the heart of the Carolina coast.



"She's a blowin'."

"Yeah, she's blowin', all right." Hurricane Eduoard, still far out at sea at the end of August '96, was moving north-northwest right toward the central Carolina coast, and the steady talk in the waterfront shebangs of Beaufort was of wind speeds and storm surges and wishful thinking about harbors of refuge.

"She comes in here blowin' a hundred on a full-moon high tide, I'm sunk."

"You ain't alone."

"Sure wish I knew somebody up in New Bern that had room for my boat."

"You ain't alone on that one, either."

"Man, if the harbormaster orders these slips cleared . . . ."

The Friday night breezes grew gusty, and though the winds weren't yet blowing a gale by Saturday morning, they were sure enough on the way there. We didn't have a big boat on hand to worry about, and so left that uneasy task to the sailors and the fishermen and the cruiser captains all watching The Weather Channel at Clawson's, the Back Bar and the Royal James as if the very Fates were in the boxes before them.

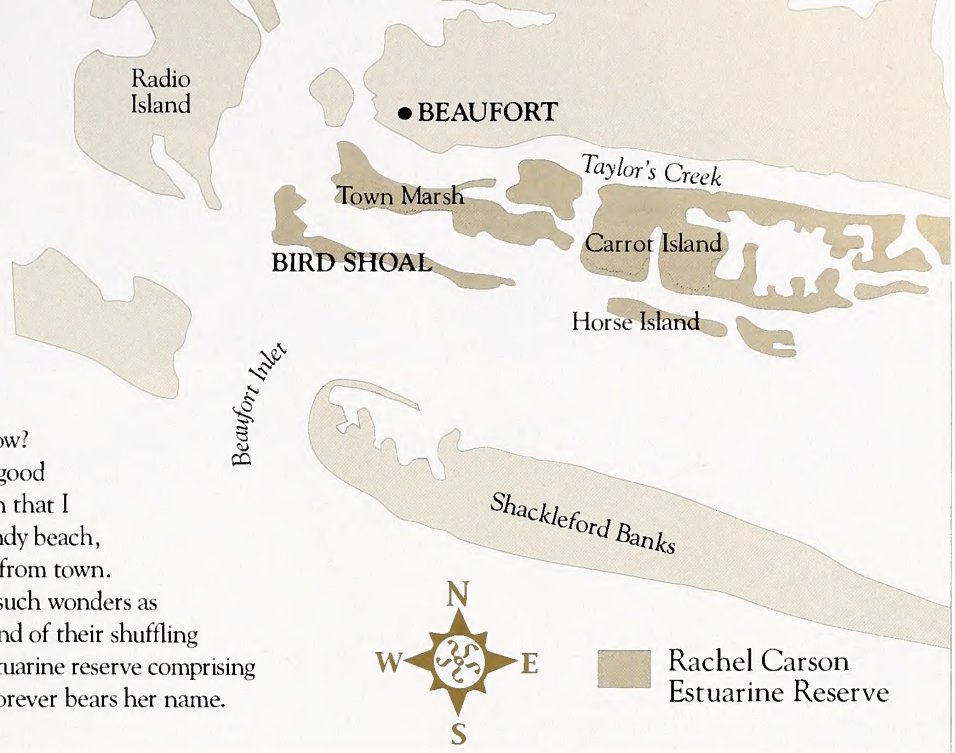
Before noon Saturday, while we still could, we went out in our johnboat up Taylor's Creek toward the fish plant and into the breach of Carrot Island called Deep Creek, just to spend an hour staring into the rising weather while the storm was still cutting its teeth—just to take the view from Bird Shoal.

The approaching hurricane and the nearness of the full moon had soaked the slough, so at high tide—which normally put only a foot or so of water back in these flats—we were able to putter along on the little motor in a half-fathom or better and get right up into the now-drowned marshy backside of Bird Shoal's sandy strand. No one else was out there, and even the wild ponies had made themselves scarce. The real danger of the storm lay many hours away though, and we enjoyed taking in the full anticipatory moment. We looked upon the bright white egrets stalking fish in the flooded grass, at ibis in there too, and marveled at how snails by the millioncount had slid right up the grass shafts all about and gotten themselves out of the water and into the wind, grouping up before the blow.

My wife, Ann, and 4-year-old daughter, Cary, and I were awed, too, by the show the lusty breezes made as they tore the tops off waves breaking over a big new sandbar in the bay between Bird Shoal and Shackleford Banks. In Beaufort Inlet—near where Blackbeard's sunken ship, *Queen Anne's Revenge*, would be found only three months hence—Eduoard's advance winds were ripping the inlet breakers in half.

ghost crab

brown pelicans



Cary ran to the end of a sandspit, and we trailed her, turning up along the way a couple of crabs: a large hermit and a 4-inch horseshoe. I studied the slough's low, green live oak and myrtle fringe, the rooftops and chimneys and fish-plant smokestacks of the town beyond; mused upon our family's small place in this enormous maritime world; and felt thoroughly at home. For a moment I reckoned that, if asked, I'd give Bird Shoal as a forwarding address, but then I thought: We've got a big blow coming, and besides, who on earth other than the Carteret County woman I'm already here with do I need to hear from just now?

Turns out that all our trips out to Bird Shoal have been good ones, and so it is just the plainest of old-fashioned affection that I feel for this patch of islands and shoals, this collection of sandy beach, tidal flats and shrubby hammocks just over Taylor's Creek from town. Rachel Carson once walked—and worked—here, noting such wonders as the fiddler crabs moving about the mud in droves, the sound of their shuffling "like the crackling of paper." Now the 3-mile, 2,300-acre estuarine reserve comprising Town Marsh, Carrot Island, Horse Island and Bird Shoal forever bears her name.

It is an easy place to turn one's mind loose, like those 20-odd wild ponies on the run hereabouts—a spot to shake off the jangled onrush and overload of everyday images and to encounter as unencumbered as possible this one sublime, elemental edge of the sea. Those who can envision the entire universe by looking into a single seashell will find here all the universes they'll ever need; what I have found in over a dozen years of roaming this marge is that I can see the world well enough when looking out from Carrot Island and Bird Shoal.

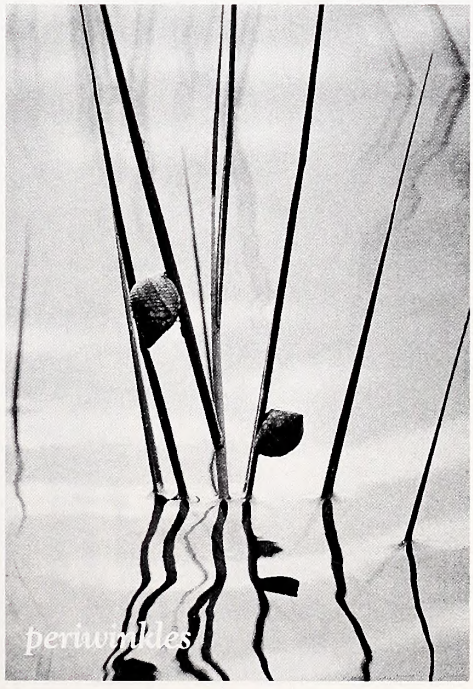
> *"We went out...just to spend an hour staring into the rising weather while the storm was still cutting its teeth—just to take the view from Bird Shoal."*

I can see all the way up the coast to the black-river narrows on the Pasquotank at Elizabeth City, where I lived as a boy and learned to love the water; and out from there over the potato fields of Camden and the orchards and produce stands of Currituck; and across the big long bridge (named for our near-mythical first fliers, the Wrights) that leads over to Kitty Hawk, where I learned to love the sea. And I can see another spot, a mite closer, where my grandparents met, courted and married, the tiny riverport where the Scuppernong slims down—Columbia, next to which Elizabeth City is a Gotham.

What else can one glimpse from this vantage point? Why, Winky and Nancy Wood's ship's-timber house in Wanchese; Commander Hollowell's Owl's Roost where Newbegun Creek hits the Pasquotank; the Cypress Grill when it's open in the herring-run spring on the Roanoke River at Jamesville; Jake and Rachel's big bungalow and oyster midden near the Pamlico River at Little Washington; Jim and Caroline's Bogue Inlet live oak nest; Linwood's creekside fish camp at Hampstead far to the south; the double-bay-windowed house my mother was born in on Sixth Street in Wilmington, just around the corner from the big fountain and just a short, unbrisk walk from the swift-flowing Cape Fear; and then Southport downriver of that and, across the bay, Oak Island where my grandfather spent World War I and where the light that now shines upon the big sea waters is among the brightest in the world. From Knott's Island way on down to Little River Inlet, I swear on a stack of Luther Lewis's Down East crabcakes that you can see the whole Sound Country from a seat in the sand on the long, curving south side of Bird Shoal.

The shoal is a progger's paradise, an unpopulated place to wander around and through. Shorebirds are its leading citizens—plovers, oystercatchers, willets, sandpipers, dowitchers and more. Pelicans fly low to the water, and porpoises commonly cavort near the sandbanks shallows seaward of the shoal. Here on Bird Shoal in 1912, Dr. F.W. True happened upon the truly uncommon, a very rare leviathan whose breed is now named for him: True's beaked whale.

In the summertime, when we swim here, this is where we find live sand dollars, furry on the bottom and the color of dried blood. Even late winter is sublime, like the 70-degree sunny afternoon one March when Cary was 2 and filled with delight at the sight of a heavy mare and four other ponies grazing mid-island, and was still carrying on about them during a scallops-and-oysters


periwinkles

white ibises

Shackleford sea oats

dinner back in town. We told our daughter that the largest of the ponies would soon be a mother, and when we saw that mare and her foal walking along Taylor's Creek the next August, Cary remembered.

This sort of carryover and the comprehension that comes with it, this sort of all's-right-with-the-world feeling, I have begun to come across as well just around the watery corner from Bird Shoal, on up in Core Sound—at Willis's and Morris's fish camps on the banks there, at Wilbur's Camp to the north of them and, more north still, at Harbor Island, the diminutive new-moon sliver of shells separating Core Sound from Pamlico.

But these are places I am only beginning to get to know; I have yet to crawl over them dozens of times, as I have Bird Shoal. All of us have such places, and we all know that the steady accretion of meaning—through repeated visits, sojourns, stops, landings, ambles—downright takes a while. In the human world, such things as violence and unkindness do reveal themselves all at once; but in the natural realm, woods and fields and waters, however they appear at the moment, are always suggesting what they will be next, once the moment or the day or the season or the wind or the light changes, and suggesting further that one must return to the same place again and again if one would see into the heart of its matter, or even come close.

Now I admit not everything that happens out here on Carrot Island and Bird Shoal is as well-organized as Hurricane Eduoard, which after all the local bluster and talk gave our coast only a pawstroke, a brush, a glancing blow. Such misadventures as we have do, though, seem to err on the innocent side.

Once we nearly kidnapped the peddler's cat—by accident, ignorant of its provenance—when it came aboard our johnboat beached near Cape Carrot on the Piver's Island end of things and seemed to want to return to mainland Beaufort. Thinking it a stray, I would've taken it on into the local animal shelter but for the good advice of a Jacksonville counsel who solved the mystery and forestalled all possible litigation with one jaunty declaration—"Well, I see you've made friends with Clam Bob's cat!"—whereupon we repatriated the untagged feline to the peddler's live-aboard scow that for years has lain at anchor nearby.

Another time we had a runabout full of family—which is to say many children—anchored by the beach at Bird Shoal, everyone picnicking, swimming, having a big summer time of it. When I checked the boat's fuel, I found that we had just about enough left to get us from Bird

Shoal back to the main channel into Beaufort, where we would run out and doubtless achieve derelict status. The only solution was for Ann's sister, Carolyn Kindell, and me to leave the rest of the party intact and at leisure there on Bird Shoal and to walk back across the flats and the island, swim Taylor's Creek, raid the garage in town for a small gas tank, recross the creek by johnboat and return afoot with fuel sufficient to get us back to home port. Done.

"Those who can envision the entire universe by looking into a single seashell will find here all the universes they'll ever need."

How would I measure or take stock of the pull of the place? Perhaps it started years ago with the old familiar feel of Beaufort, with its flat sidewalks and streets so reminiscent of Elizabeth City, my first hometown, and its basic port smells of fish and fuel from the churning of the fleet; and of the sound of gulls and redwings and the sight of night herons coming in at dusk and taking their appointed positions on the dock pilings; and the bright waxen look of the red yaupon berries; the good pungency of Carrot Island's myrtle thickets in the heat; the huge, 360, big-sky, all-around view; and too, the sight of children small and large padding across the shoal's broad mud flat; and now and again the heightened sense of being abroad on the dark water, boating by night.

One summer evening, several of us were drifting down Taylor's Creek—the creek waters nearly glass and the town's neon lights shimmering on the dark mirror—and music came sliding over the water, some old love song from a lone guitarist. We cruised past the short, dark cedars of Town Marsh and on around Piver's Island, skylighting channel markers and catching the light from some street lamp or another and following the reflected streams of light so as to see and avoid any stobs that might lie in our way. The night sky that evening was murky, except to the south where, on the horizon above Carrot Island, sat Scorpio clear and bright as a silver fishhook.

So we were caught, and are hooked yet.

When our twins were much younger, I used to tell them a story on the way to school, a tale in which they were a pair of heroic travelers who on their own had gone to England, stayed a spell and even visited the queen at Buckingham Palace prior to coming back to America—all told matter-of-factly, as if it might have really happened.

The sailing ship that brought them home in the tale came back into North Carolina by way of Beaufort Inlet, and once through it, the children would rush to the ship's rail and see their kin gathered together and waving to them, all of us welcoming them from the shoal's outer beach, and their mythical return to the heart of our coast, as viewed from Bird Shoal, was then and is now altogether meet and wholesome and right. ⊠

Bland Simpson, author of Into the Sound Country, *teaches creative writing at the University of North Carolina at Chapel Hill.*

One bitter cold January morning I found myself in the duck blind of a good friend, an older gentleman with the title to a prime piece of Pamlico Sound salt marsh. About midday my breakfast was wearing thin, and I wondered aloud if there were any snacks to be had. My pal pointed me toward a cooler in the stern of the boat. "It's loaded," he said. "Help yourself."

Inside I found a bag of chips, a jar of salsa and enough canned Beanee Weenees for a small expeditionary force. Perhaps you have never wondered what ice-cold Beanee Weenees taste like in a 22-degree salt marsh. Methinks you never should.

I thought of that day this past spring, as I was loading up the larder for a quick two-day canoe camping trip along the Roanoke River. I'd volunteered to handle dinner duties, so I knew what sort of feast was in the offing a few hours hence. The cooler held 24 dove breast fillets, fresh Parmesan cheese, olive oil, garlic, chopped parsley and other comestibles rarely found in a two-man canoe. My buddy, Scott, was packing breakfast. I didn't know what he had up his sleeve, but I knew Scott, and I knew it wasn't instant grits and Pop Tarts.

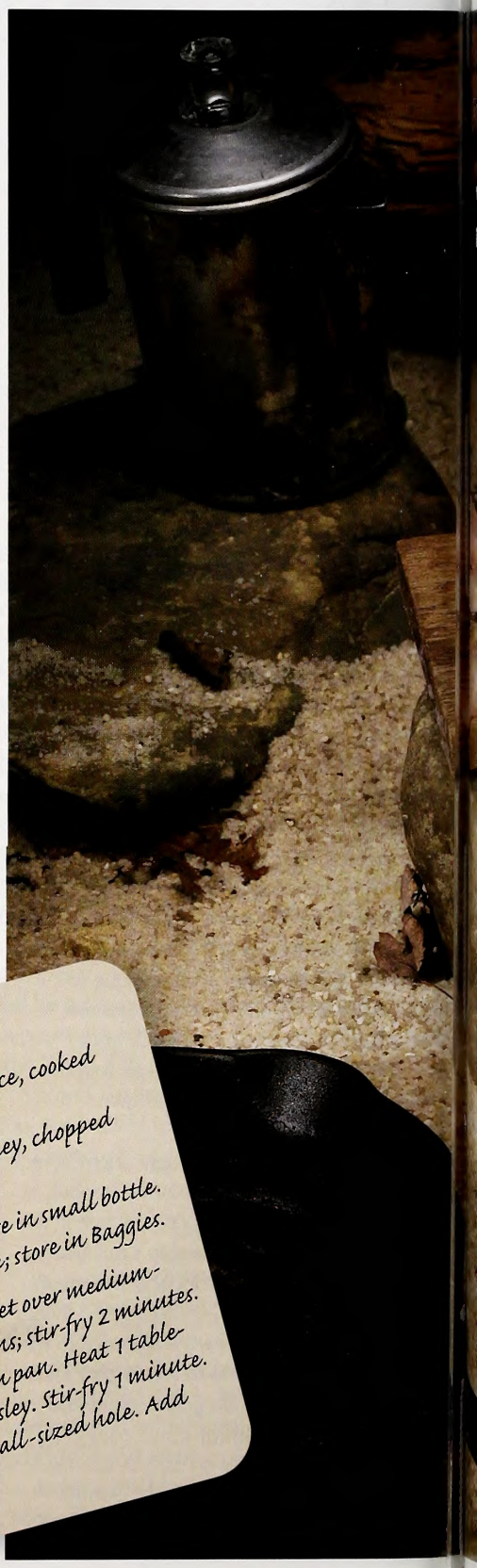
"If I'm cooking breakfast," he'd told me earlier, "then make sure you pack plenty of stove fuel." I could feel my arteries hardening already.

You see, there was a time when backcountry cooking was a minimalist exercise. Even those who, like me, steadfastly refused to rely on freeze-dried fare had to work mighty hard to rustle up a memorable meal. You can take a chicken out of the can, but. . . .

Now I am the proud owner of exactly four times as many boats as backpacks. And I'm not the only one. More and more people are taking to the woods these days in a boat, whether powered by paddle or motor. For sure, a boat—be it canoe, kayak, power skiff or cuddy cabin—allows you to get access to distant islands and out-of-the-way backwaters. But what a boat really does is enable you to carry better food and more of it.

Ever since I started camping as much with a boat as with a backpack, my backcountry dining has gone to new heights. I would never have hiked with 3 pounds of venison stashed in a side pocket. But in a boat—load up the cooler! Fact is, I recently had to buy a 20-foot center console just to haul my food and cooking gear. Just had to.

So here are some recipes to take your shore lunches and riverside dinners to a new level. They're easy. A few call for wild game, but you can substitute your favorite cuts of meat. Most can be prepared with a single skillet, and all are designed for a backpacking stove. Whether your trip is a week on the Intracoastal Waterway, or a quick day getaway on the river casting for stripers and shad, these recipes will make you forget all about Beanee Weenees. Which isn't so hard to do.



I once kayaked with a guy who had a full-sized wok strapped to the hull of his boat. That was a man with his priorities in order. Stir-frying cold rice prevents the grains from clumping. Add to the mix bite-sized chunks of fresh fish—the firmer the flesh, the better—and here's a meal you can cook in one pot in less time than it takes to land an albacore.

Fish Fried Rice

1 1/2 pounds fish fillets, cut into bite-sized pieces
4 tablespoons soy sauce
1/8 teaspoon minced ginger root
1/8 teaspoon ground red pepper
2 tablespoons vegetable oil, divided
1 cup canned peas
1/3 cup sliced green onions
2 packages boil-in-bag rice, cooked and chilled
2 tablespoons fresh parsley, chopped
3 eggs

At home: Mix ginger root with red pepper and soy sauce; store in small bottle. Chop parsley. Chop green onions into 1/4-inch pieces. Cook rice; store in Baggies.

In the field: Heat 1 tablespoon of vegetable oil in large skillet over medium-high heat. Stir-fry fish fillets 1 minute. Add peas and onions; stir-fry 2 minutes. Add soy sauce. Stir well and remove the fish mixture from pan. Heat 1 tablespoon of vegetable oil, and add the rice and chopped parsley. Stir-fry 1 minute. Scrape mixture away from center of pan, leaving a softball-sized hole. Add eggs and scramble. Mix with rice and fish.

shore dinners

Forget the Beanee Weenees! Here are a few recipes to liven up your meals on the water.

written by T. Edward Nickens ©2001
photographed by Melissa McGaw ©2001

On my last canoe camping trip, we feasted on this little bit of Italy deep in the swampwoods of eastern North Carolina. The hardest part about cooking this dish is not eating the dove breast fillets right out of the pan.

Doves Carbonara

12 dove breasts, filleted
2 garlic cloves, minced
12 ounces uncooked thin spaghetti noodles
3/4 cup grated Parmesan cheese
2 tablespoons finely chopped fresh parsley
1 cup milk
3 eggs
2 tablespoons butter
1/2 teaspoon black pepper

At home: Fillet dove breasts and place in plastic Baggie. Chop parsley. Break eggs and combine with milk; store in small water bottle.

In the field: Cook spaghetti noodles and drain. Melt butter in large nonstick skillet. Sauté dove breasts and minced garlic for 1 minute. Reduce heat to low; stir in noodles, cheese, parsley and pepper. Pour egg-milk mixture over noodles and cook about 4 minutes, stirring constantly, until sauce thickens.

This is a one-pan wonder. It's cheap, easy, filling and fast, and it makes its way to my home table a couple of times a month in various interpretations. Replace the venison with shrimp and the beef-flavored noodles with shrimp-flavored noodles and have an entirely different taste.

No-Sweat Asian Venison

1 pound venison, cut into strips
2 teaspoons dark sesame oil, divided
1 package broccoli slaw (12 ounces)
1 cup sliced green onion
2 packages beef-flavored ramen noodle soup
1 1/2 cups water
2 tablespoons soy sauce

At home: Slice green onions into half-inch pieces. Slice venison tenderloin into thin slices.

In the field: Heat 1 teaspoon sesame oil in a skillet over medium-high heat; add venison and onions and sauté about one minute. Remove to a separate plate. Heat remaining oil until hot; add broccoli slaw, and stir-fry 1 minute. Add to plate with venison and onions. Add water to skillet and bring to a boil. Add noodles from both packages and seasoning packet from one package. Cook until most of the liquid is absorbed, stirring frequently. Stir in venison, onions and slaw; add soy sauce and combine.

I first tried these sandwiches during the peak of the striper run on the Roanoke River. Almost forgot to fish. This is an excellent barbecue sauce for chicken, so make a double portion and freeze the leftover. You can find ancho chilies in specialty food stores and larger grocery stores.

Chopped-Duck Sandwiches in Cherry Barbecue Sauce

1 cup apple cider vinegar
1/3 cup ketchup
1/3 cup chopped onion
1/3 cup dried tart cherries
1/8 cup water
1 1/2 tablespoons molasses
1 large dried ancho chili pepper
1 garlic clove
1/2 teaspoon ground coriander
pinch of ground cloves
2 pounds duck meat, cooked and chopped
4 large kaiser rolls

At home: Grill or sauté duck breasts or whole ducks, then chop the meat. Remove stem and seeds from ancho chili pepper. Combine all ingredients except duck and kaiser rolls in medium saucepan. Bring to a boil, then reduce heat to medium low; cover and simmer until cherries are tender, about 20 minutes. Let cool, then puree the mixture in a blender. If needed, return sauce to pan and simmer uncovered until sauce thickens to consistency of tomato-based barbecue sauce. Add chopped duck.

In the field: Load up the buns and eat.

This is easier than falling off a mossy log. To make it even easier, buy coleslaw from your grocer, but you'll miss the apple punch of the cider vinegar. A great thing about wrap sandwiches is that you can eat them with one hand, leaving the other hand free to grab a rod and set the hook.

Cajun Fish Wraps with Slaw

Slaw:

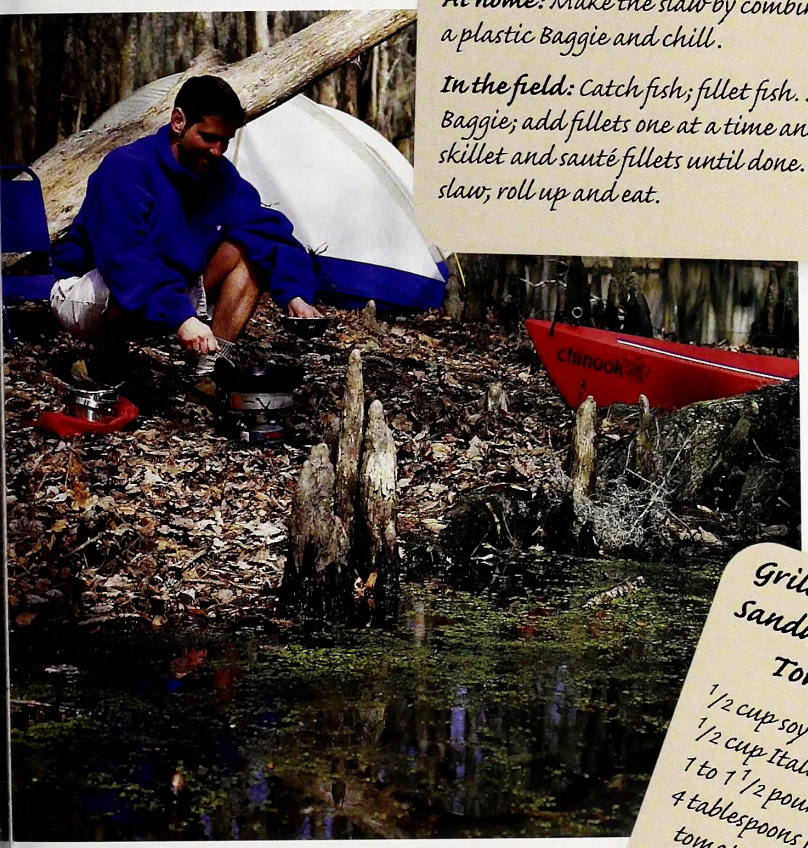
3 1/2 cups thinly sliced red or green cabbage
1/4 cup mayonnaise
1 1/2 tablespoons cider vinegar
1/2 teaspoon sugar

Wraps:

1 tablespoon all-purpose flour
6 tablespoons Cajun seasoning powder
4 half-pound fish fillets
1 tablespoon butter
4 flour tortillas, 8 inches each

At home: Make the slaw by combining all four ingredients in a bowl. Place in a plastic Baggie and chill.

In the field: Catch fish; fillet fish. Mix flour and Cajun powder in a plastic Baggie; add fillets one at a time and shake until covered. Melt butter in a skillet and sauté fillets until done. Place one fillet in a flour tortilla. Top with slaw; roll up and eat.



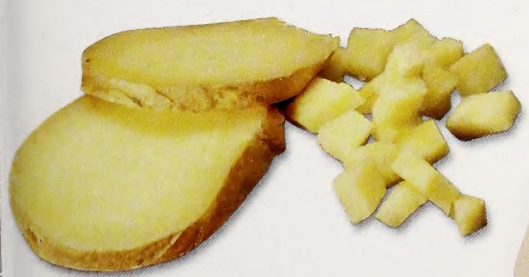
Cold, thinly sliced venison is the finest sandwich meat ever made. I've packed these sandwiches into duck blinds and on paddle trips for years. One of the secrets is good bread. I don't know what's better—the sandwiches, or the looks on the faces of my pals as they stare into yet another PB&J.

Grilled Venison Tenderloin Sandwiches with Sun-dried Tomato Mayonnaise

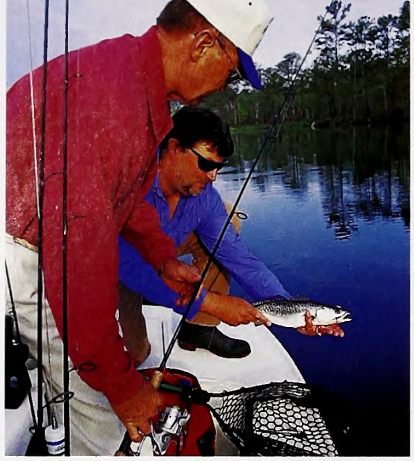
1/2 cup soy sauce
1/2 cup Italian dressing
1 to 1 1/2 pounds venison tenderloin
4 tablespoons prepared sun-dried tomato pesto, such as Bella Cucina
4 tablespoons mayonnaise
8 leaves romaine lettuce
8 slices onion
4 hearty grain sandwich rolls or 8 slices of bread such as sunflower or nut grain

At home: Combine sun-dried tomato pesto with mayonnaise; refrigerate. Combine soy sauce and Italian dressing; marinate tenderloin overnight. Slice onions into 8 thick slices, with all rings intact. Grill tenderloin and onion rings. Prepare each sandwich with: sliced tenderloin, 2 tablespoons sun-dried tomato mayonnaise and two onion slices. Place lettuce leaves in separate plastic Baggie.

In the field: Add lettuce to sandwiches. Keep an eye on the bobber.



Cut out these recipes and laminate them for your next trip on the water.



Fair Weather Specks

written and photographed by Joel Arrington ©2001

From the first hints of spring to the last breath of fall, pleasant weather belongs to speckled trout along the North Carolina coast.

Dan Holt, one of my fishing mentors long ago, used to cast a 52M11 MirroLure for spotted seatrout in the surf at Carolina Beach. That would have been in the 1950s. He used the best equipment of the day—a Harnel rod and a Shakespeare direct-drive reel. "One February day it was so cold," he remembered, "the fish I had left above the tide line to pick up as I fished back toward the inlet were frozen stiff as pokers."

Holt didn't let mere bone-chilling cold deter him from fishing, but most speckled trout angling is not like that. We more often catch these fish in fair weather during relatively pleasant times of the year. No wonder so many anglers remember their trout fishing fondly and consider it their favorite. Among those fishing from boats, only flounder were more popular in a recent survey; from piers, only spot.

Nationally—which means the South, because that's where speckled trout live—anglers caught more than 29 million in 1999, according to the National Marine Fisheries Service, releasing more than 18 million, about 63 percent. The center of abundance for speckled trout is the Gulf Coast, but significant fisheries occur up the Atlantic through Chesapeake Bay. Here in North Carolina, anglers landed more than 411,000 in 1999, the most since 1994, and released 253,000. Last year, after cold-kills in February, speckled trout landings in the state fell nearly 50 percent.

That's the main problem with specks. Though we enjoy fishing for them in pleasant weather, experts say extremely cold weather plays the biggest role in speckled trout abundance in North Carolina. Owen Lupton of Reelsboro witnessed a cold-kill in February 2000.

"It was about a week after the snowstorm, when warming began, that they started

***Though they can** be elusive at times, speckled trout can usually be found where marsh grass meets salt water during the warmer months.*

LAWRENCE S. EARLEY

Trout for All Seasons

Spotted seatrout, or speckled trout, are a member of the drum family (Sciaenidae), with croaker, weakfish and red drum. The species (*Cynoscion nebulosus*) occurs from New York to the northern Gulf of Mexico, preferring the brackish water of bays. North of approximately Cape Fear, part of the Atlantic population may migrate to the ocean in winter where they are caught largely in the surf zone. Fish from the Chesapeake Bay may in winter migrate along the beach at least as far as Cape Lookout.

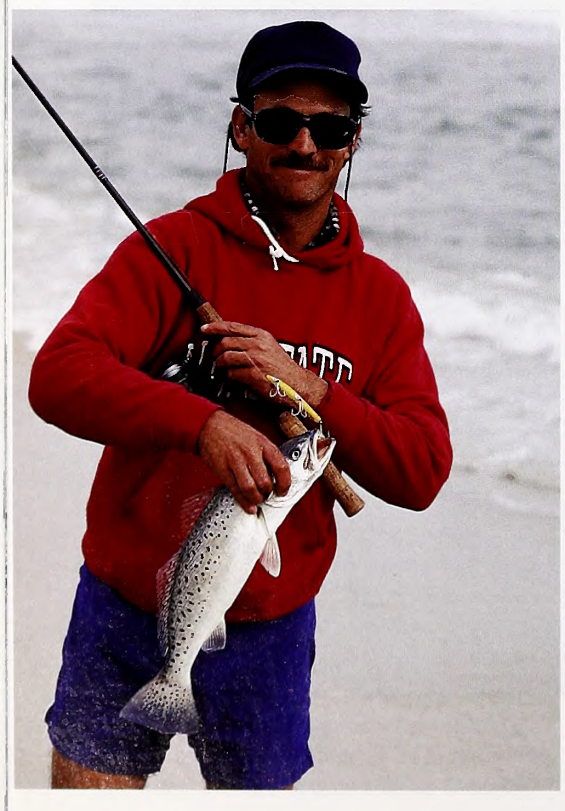
Carolina specks become sexually mature at age 1. Males grow at a slower rate than females. A 14-inch female may be 2 years old, whereas a 14-inch male may be 4. The evolutionary logic of this, according to Dr. Charlie Wenner of the South Carolina Department of Natural Resources, is that the bigger the female, the more eggs she can carry. The more she carries, the greater the odds that she will produce young.

The spawning season extends from April until August. As the eggs become mature, a clutch is spawned at night. A new batch forms, and the fish spawns again. Thus, speckled trout are described as batch spawners. Older fish begin spawning earlier in the season, according to Wenner, spawn more frequently than younger fish, spawn more eggs in each batch, and spawn over a longer period.

Although every angler tries to catch large fish, the recreational fishery yields mostly 1- and 2-year-old trout. Mortality limits the number of trophy fish. But a healthy population needs both young and old trout. "The older fish," Wenner points out, "are the most important members of the population." He said preliminary research indicates superior egg quality in older fish, with richer nutrients producing bigger, stronger larvae.

Speckled trout vary widely in abundance from year to year. Beyond disease and predation, fishing mortality and cold-kills are the primary limitations. But trout are relatively hard to catch in a gill net and, because they tend to remain in shallow water, are seldom caught in trawls. Many managers consider cold-kills the main mortality factor, advising a "use 'em or lose 'em" management strategy. When temperatures remain below freezing, the fish that have not migrated to the ocean must seek deeper water, where they gather in dense schools and may be stunned or killed from the cold.

SEASON	LOCATION	DEPTH	WATER TEMP
Spring	weed beds, oyster bars and points; tributary creeks	shallow	50–60 °F
Summer (early)	weed beds	shallow	60–75 °F
Summer (mid-late)	deep holes, grass flats and oyster bars	shallow to deep	75–80 °F
Fall (early)	grass flats and sloughs, river points and oyster bars; tributary creeks	shallow	60–75 °F
Fall (mid-late)	tributary creeks and the surf zone	shallow	50–60 °F
Winter	deep holes	deep	50 or less



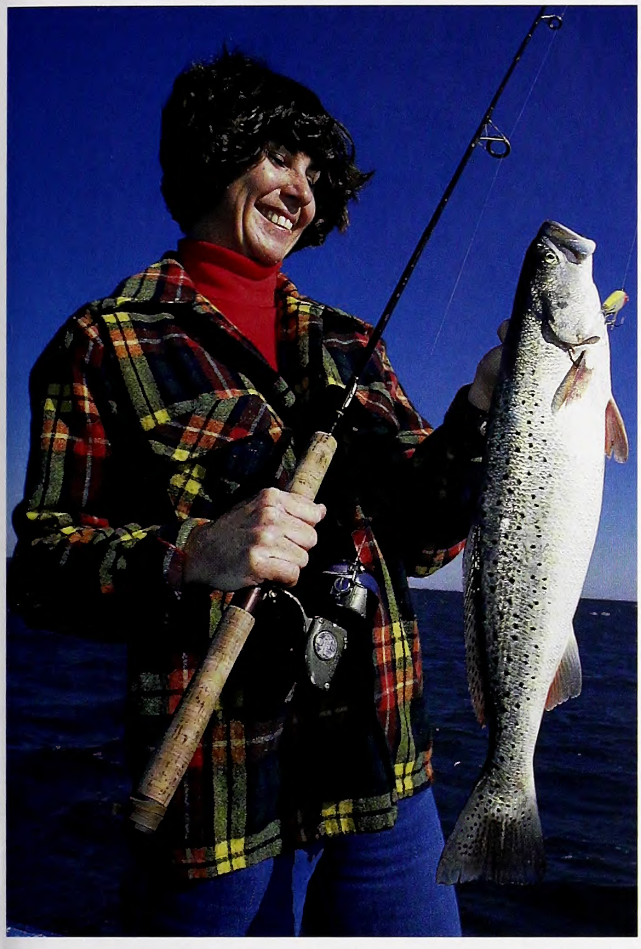
surfacing," he reported. "When the trout first began floating up, I had it all to myself. Some were obviously dead. There was no movement, gills were full of mud, and no coloration to the gills. Those fish were just plain dead, nothing to be done about it. Strangely, the bigger fish seemed to have been a higher percentage of the dead. But lots of the fish were alive and upside down, finning weakly," he said. "While I only picked up the limit, I watched this for a long time over a three-day period. Of course, others soon found out and picked up all they could find—in the hundreds, sadly. You could come right back 15 minutes later and more fish would be popping up in the same places.

"On the third day," Lupton continued, "when all the folks had about gotten the majority of the fish, and I was once again by myself, all those floating were alive. They would stay on the surface maybe 10 minutes upside down. Then they would warm up, get their equilibrium back, turn over and swim slowly off and back down out of sight. How many of those fish might have died, I don't know, but I don't think any of those that turned over and swam off died."

When speckled trout are abundant, Tar Heel anglers catch and release many, but few over 4 pounds are landed in any year. Fishing guide Gary Dubiel of Oriental reported catching more than 100 fish one day in December 1998, with 15 weighing more than 4 pounds. That is exceptional trout fishing.

It takes a 4-pounder to earn a citation in the state fishing tournament. A 5-pound trout will make the most experienced angler grin. A mere handful over 8 pounds are caught in North Carolina each year, although that would be an unremarkable fish from, say, Florida's Indian River Lagoon or Texas's Padre Island. There, with less frequent cold-kills, only a 10-pound trout will raise a veteran's eyebrows.

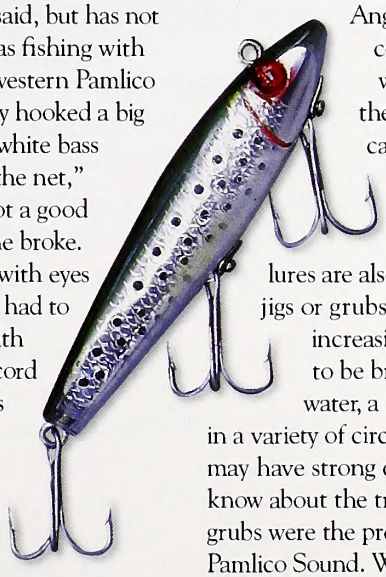
***A topwater plug** (above) and a Mirro-Lure (right) are both proven speckled trout lures. In temperate seasons, specks are most catchable close to shore, such as from the surf. But winter and summer extremes drive specks to deep water (opposite top).*



Doug Mumford is an experienced trout angler as well as a N.C. Division of Marine Fisheries biologist and statistician. He has seen two trout over 9 pounds, he said, but has not caught any that large. He was fishing with David Oakley of Raleigh in western Pamlico Sound one June when Oakley hooked a big trout on a jig with a 6-inch, white bass worm. "He had it almost to the net," Mumford reported, "and I got a good look at the fish just as the line broke. Must have been 3 feet long, with eyes as big as quarters. That trout had to weigh 10 pounds," he said with palpable regret. The state record weighed 12 pounds, 4 ounces when it was caught at Wrightsville Beach by John R. Kenyon Jr., in late December 1961.

Speckled trout tagged in Chesapeake Bay have been captured in North Carolina, but Tar Heel trout are little studied. Scientists don't know exactly where they go. Theories about trout migrations pose a conundrum. We know that some exit the estuaries to the ocean in the fall. Others remain, moving in dense schools into deep creeks when the temperature falls. Do some leave for the ocean one year and remain in the sound the next? If so, how does a trout decide whether to winter in the bay or in the ocean? Because so many are killed by cold in the sounds, shouldn't fish with a genetic predisposition to remain there have been eliminated long ago from the gene pool? Clearly we do not have all the answers.

Anglers fish for trout with live baits—shrimp when they can get them, or mud minnows and finger mullet that they catch with traps or cast nets. In spring and summer especially, pieces of soft crab under a float are effective.



Anglers may employ a popping cork. That provides a good weight for casting, suspends the bait off the bottom and can be chugged to simulate a feeding fish, attracting trout with sound as well as smell. Artificial lures are also great for trout—basically jigs or grubs and mirror plugs, and increasingly flies. Trout flies tend to be bright and flashy. In shallow water, a 1/4-ounce grub does the job in a variety of circumstances. Veteran anglers may have strong color preferences. I don't know about the trout. For years, lime-green grubs were the predominant lure in eastern Pamlico Sound. Whether angler choices are merely fashion or based on genuine fish preferences, we will probably never know. Certainly old colors and patterns continue to catch fish. If a scientific test could be devised, which is doubtful, it is unlikely that any color could be shown to be superior to white. Other trout specialists like MirroLures, some packing a wide variety of weights, colors and sizes to fish at different depths and to imitate various minnow species. Many argue that larger lures tend to catch larger trout, leaving unmolested the smaller ones, which they would release anyway.

A Louisiana study found significant differences in postrelease survival between angling methods. Ninety-seven percent of trout caught on artificial lures with treble hooks survived, 91 percent on single-hook lures, 83 percent on live bait with a treble hook, and 74 percent on live bait and a single hook.

Trout are a species of the estuarine shallows, but they are attracted to structure, probably for the bait that hold there. A submerged wreck, oyster bar, shell bottom, jetty or artificial reef may hold trout. In spring and summer you can find them in shallow weed beds, which they search for soft crabs and other prey.

Wade fishing appeals to many anglers. Reports of good-sized specks caught by waders come from eastern Pamlico Sound near Avon. Other Hatteras Island wade spots include Oregon Inlet and New Inlet. Techniques employed while wading are similar to those from boats. Wear waders and take a stringer that you can attach to a belt. A collapsible net might save you a fish or two.

Dawn and dusk are prime times in the surf. Night fishing, especially in the fall, can be memorable. A bright moon makes fishing even more pleasant. With a light wind more or less in your face, locate a bar not far off a steep beach with both ends open to the ocean and with little vehicle traffic. Start an hour before low tide, when you can likely reach the bar. In windy weather, fish a longer rod, but in light or calm winds, a 7-footer is about right. Spool with 6- to 10-pound test monofilament.

Some specialists like low-stretch lines, the better to feel the delicate bites of speckled trout. Select the lightest MirroLure you can cast to the bar. Let it drift off while maintaining a tight line, and concentrate on the lure during a slow retrieve. Takes become increasingly subtle as the water temperature falls until you need a barely moving retrieve. Below about 53 degrees, any fish left in the slough are unlikely to bite.

When the weather turns foul, go drum or striper fishing. Nice days and nights belong to speckled trout. ⊠

Splash! You slide off the boat into the cool Atlantic just beyond Cape Fear. Scuba bubbles gurgle around you. Eighty feet below, the desert-like expanse of sand is broken by the rocky marine community known as the

Ocean Hardbottom

written by Lundie Spence ©2001 *illustrated by Consie Powell* ©2001
nature activity by Anne M. Runyon ©2001

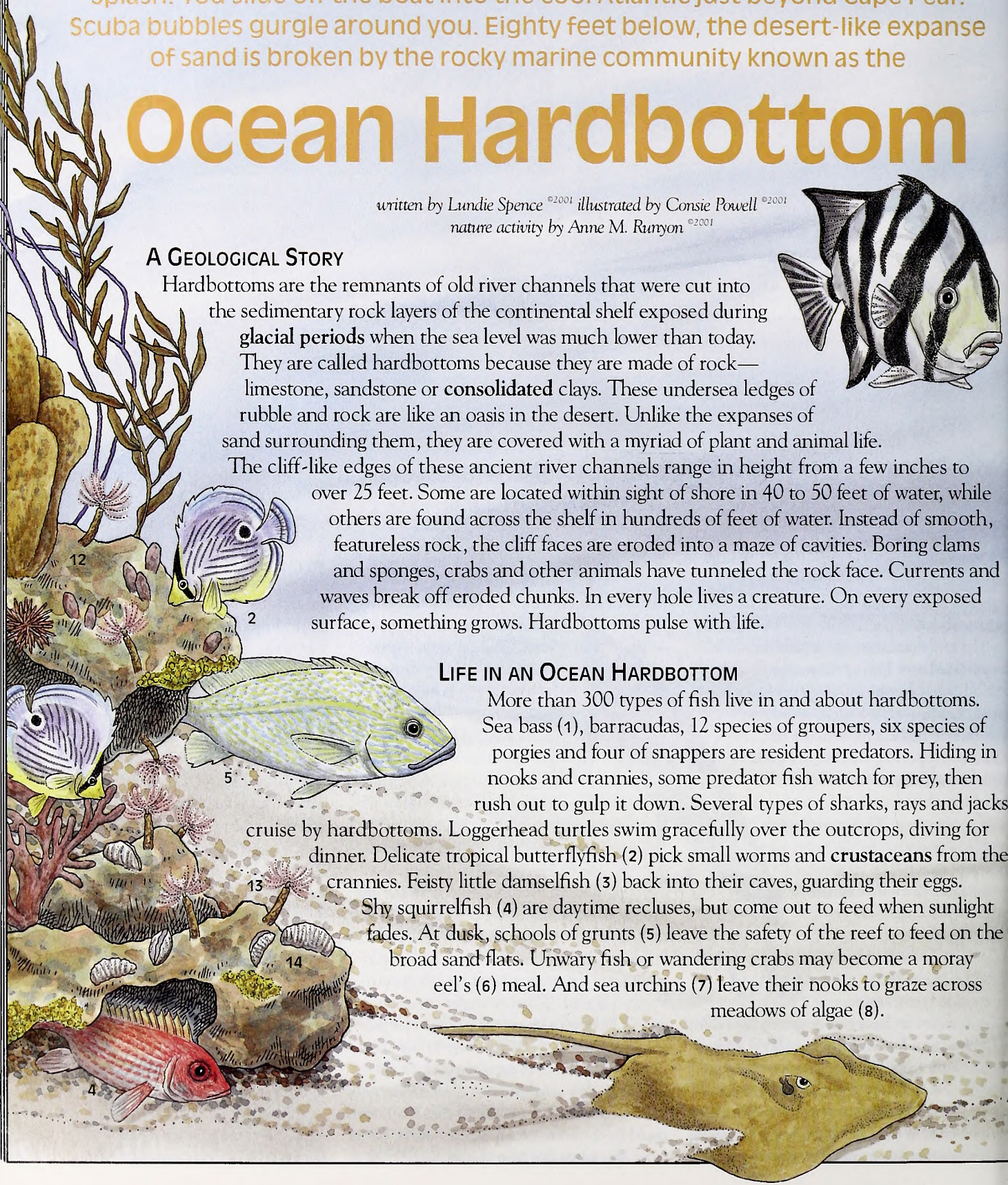
A Geological Story

Hardbottoms are the remnants of old river channels that were cut into the sedimentary rock layers of the continental shelf exposed during **glacial periods** when the sea level was much lower than today. They are called hardbottoms because they are made of rock—limestone, sandstone or **consolidated** clays. These undersea ledges of rubble and rock are like an oasis in the desert. Unlike the expanses of sand surrounding them, they are covered with a myriad of plant and animal life.

The cliff-like edges of these ancient river channels range in height from a few inches to over 25 feet. Some are located within sight of shore in 40 to 50 feet of water, while others are found across the shelf in hundreds of feet of water. Instead of smooth, featureless rock, the cliff faces are eroded into a maze of cavities. Boring clams and sponges, crabs and other animals have tunneled the rock face. Currents and waves break off eroded chunks. In every hole lives a creature. On every exposed surface, something grows. Hardbottoms pulse with life.

Life in an Ocean Hardbottom

More than 300 types of fish live in and about hardbottoms. Sea bass (1), barracudas, 12 species of groupers, six species of porgies and four of snappers are resident predators. Hiding in nooks and crannies, some predator fish watch for prey, then rush out to gulp it down. Several types of sharks, rays and jacks cruise by hardbottoms. Loggerhead turtles swim gracefully over the outcrops, diving for dinner. Delicate tropical butterflyfish (2) pick small worms and **crustaceans** from the crannies. Feisty little damselfish (3) back into their caves, guarding their eggs. Shy squirrelfish (4) are daytime recluses, but come out to feed when sunlight fades. At dusk, schools of grunts (5) leave the safety of the reef to feed on the broad sand flats. Unwary fish or wandering crabs may become a moray eel's (6) meal. And sea urchins (7) leave their nooks to graze across meadows of algae (8).



Almost Like the Tropics

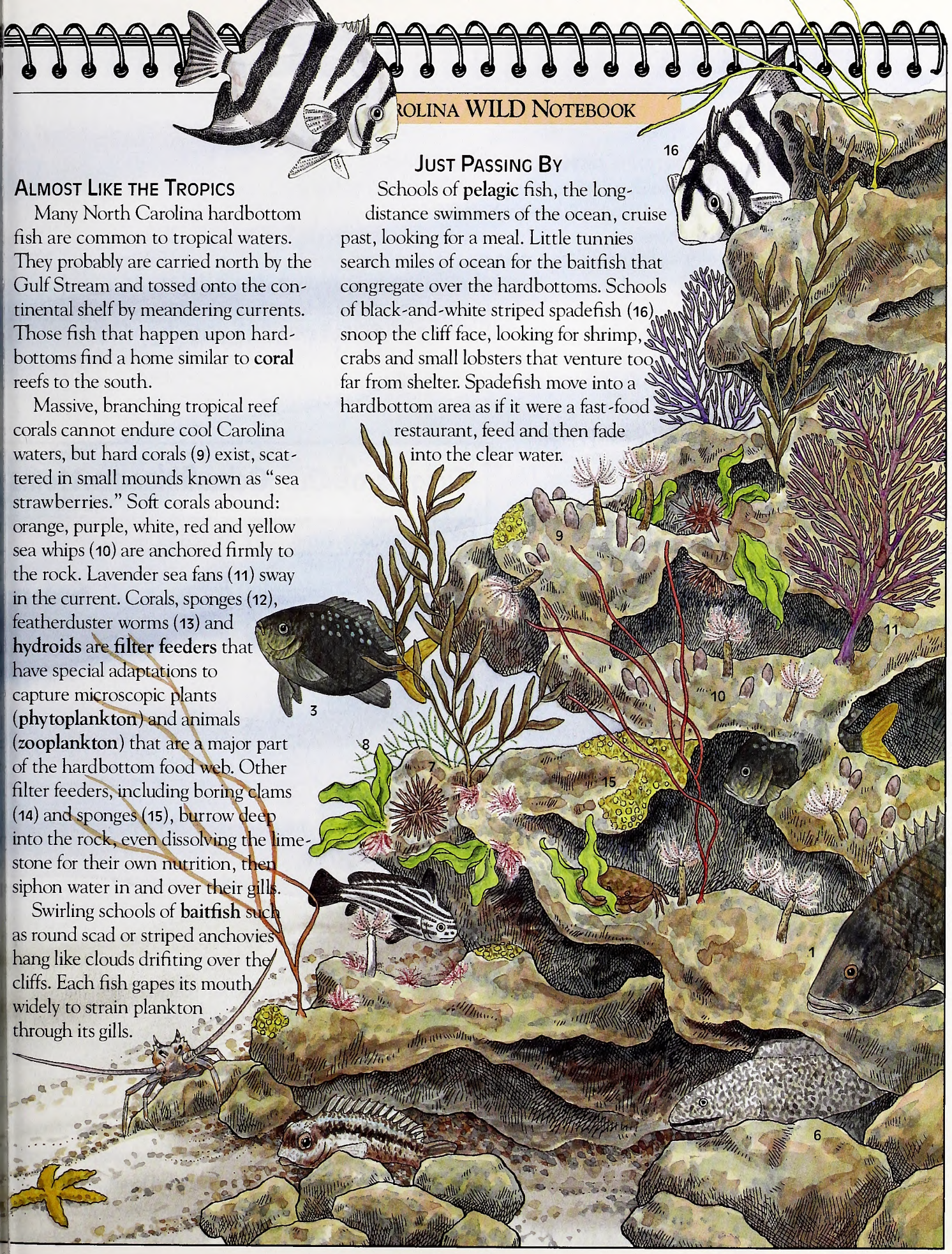
Many North Carolina hardbottom fish are common to tropical waters. They probably are carried north by the Gulf Stream and tossed onto the continental shelf by meandering currents. Those fish that happen upon hardbottoms find a home similar to **coral** reefs to the south.

Massive, branching tropical reef corals cannot endure cool Carolina waters, but hard corals (9) exist, scattered in small mounds known as "sea strawberries." Soft corals abound: orange, purple, white, red and yellow sea whips (10) are anchored firmly to the rock. Lavender sea fans (11) sway in the current. Corals, sponges (12), featherduster worms (13) and **hydroids** are **filter feeders** that have special adaptations to capture microscopic plants (**phytoplankton**) and animals (**zooplankton**) that are a major part of the hardbottom food web. Other filter feeders, including boring clams (14) and sponges (15), burrow deep into the rock, even dissolving the limestone for their own nutrition, then siphon water in and over their gills.

Swirling schools of **baitfish** such as round scad or striped anchovies hang like clouds drifting over the cliffs. Each fish gapes its mouth widely to strain plankton through its gills.

Just Passing By

Schools of **pelagic** fish, the long-distance swimmers of the ocean, cruise past, looking for a meal. Little tunnies search miles of ocean for the baitfish that congregate over the hardbottoms. Schools of black-and-white striped spadefish (16) snoop the cliff face, looking for shrimp, crabs and small lobsters that venture too far from shelter. Spadefish move into a hardbottom area as if it were a fast-food restaurant, feed and then fade into the clear water.



spotfin butterflyfish

IMPORTANCE OF HARDBOTTOMS

Hardbottoms are diverse communities of plants and animals. Their rocky ledges provide shelter for fish and invertebrates whose only other homes are in tropical coral reefs or on shipwrecks. In a sense, hardbottoms accumulate more than their share of living creatures. That's why fishermen, who know that hardbottom communities are home to important food fish, are so eager to plot their location. Recreational divers find the relatively shallow hardbottoms as exciting as coral reefs. And scientific research is working to build a better picture of the continental shelf, including hardbottoms, and the fisheries that have economic importance.

banded butterflyfish

What Does It Mean?

glacial periods: extended periods of cold climates. The last major glacial period or "ice age" was at its peak about 15,000 years ago.

consolidated: particles of clay that are compressed and may have changed into sedimentary rock

crustaceans: mostly marine, aquatic invertebrate animals having a hard, chitinous exoskeleton

corals: radially symmetrical, marine invertebrate animals that construct a hard skeleton around their soft bodies. They capture food with stinging tentacles, and some species build reefs.

hydroids: radially symmetrical marine and aquatic invertebrate animals having no hard skeleton, that capture food with stinging tentacles

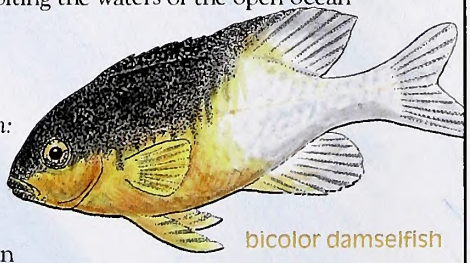
filter feeder: an animal that captures food particles by straining or filtering water

phytoplankton: microscopic singled-celled plants (algae) that drift near the surface of the ocean to receive sunlight

zooplankton: microscopic animals that drift in the ocean, usually filter feeding on phytoplankton

baitfish: a generic name for small, schooling fish that provide food for many predatory fish

pelagic: of or inhabiting the waters of the open ocean

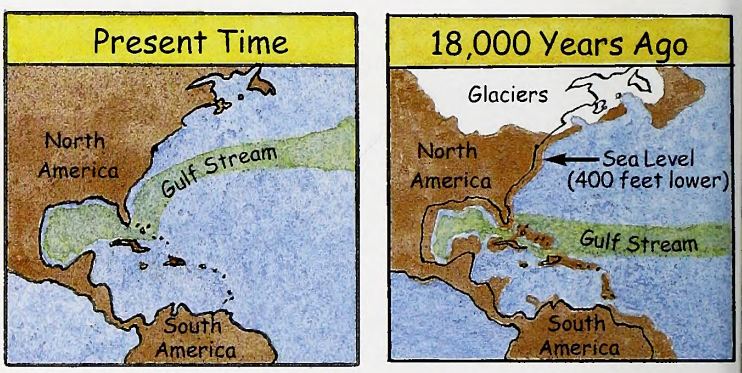


bicolor damselfish

Get Outside

Visit the Museum: You may not be able to visit an actual ocean hardbottom, but you can come close when you visit the North Carolina Museum of Natural Sciences in Raleigh. Walk through the coastal exhibit on the first floor and take a close look at the hardbottom exhibit. After you get a feel for the various plants, animals and geologic features in the display, take a look at the live hardbottom fish swimming in tanks nearby.

Origins of Our Ocean Hardbottoms



Around 18,000 years ago, huge arctic glaciers covered much of the Northern Hemisphere. In the United States, the land from the Great Lakes east to New York was buried under thick ice sheets. Out in the Atlantic Ocean the warm waters of the Gulf Stream flowed due east from Florida toward Africa, not toward Scandinavia as they do today.

North Carolina was a colder place. Evergreen forests, now common only in our high mountains, spread across much of our state. Lush grasslands and temperate forests of hardwoods and pines grew in our warmer southeastern regions.

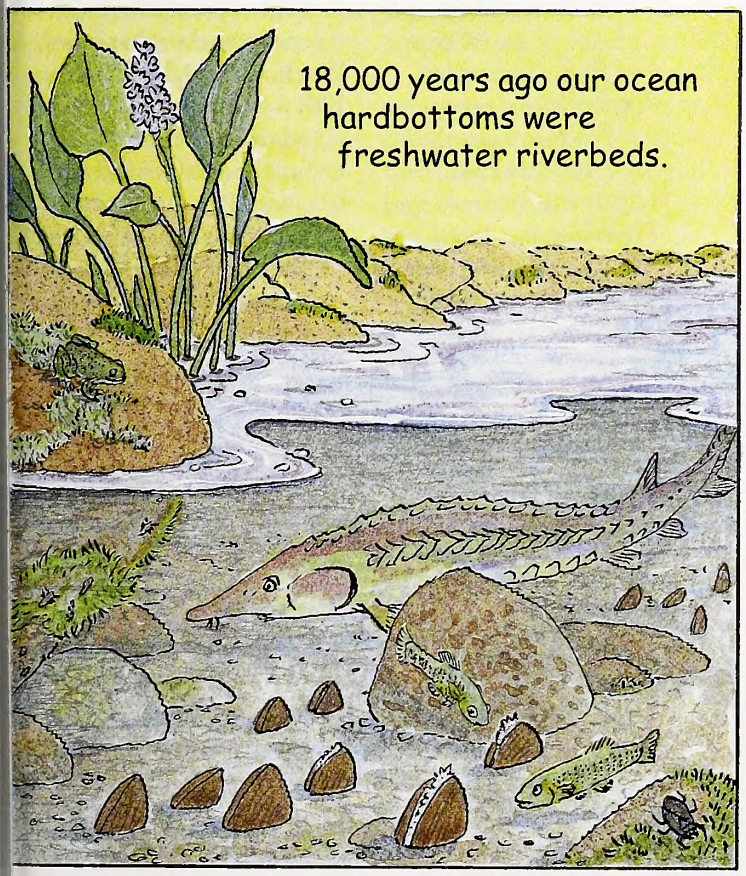
Sea levels were lower due to the huge glaciers, and North Carolina's flat coastal plain extended farther east than it does today. Cool rivers flowed toward the Atlantic Ocean, scouring rocky riverbeds into the continental shelf.

Brightly colored fish that are otherwise found in tropical areas can be found around North Carolina's ocean hardbottoms.

Threats to Hardbottoms

Because hardbottoms are such rich ecosystems, and since most of the valuable fish living in and around hardbottoms are territorial, it is possible for fishermen to harvest too many. Once a site has been exploited, it may take many years for fish to replace those taken. Already, over half of commercially important fish species are overharvested on hardbottoms from North Carolina to Key West, Fla. Their loss changes the natural balance of the hardbottom community. As we learn more about hardbottoms, we shall be able to identify other changes that could harm these special communities.

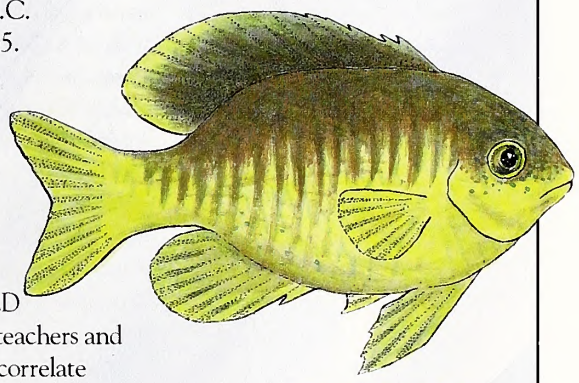
. . . . a Look Back in Time



By 10,000 years ago, the earth had warmed and the glaciers had receded from the United States. The sea level rose. Today these ancient riverbeds are covered by the Atlantic Ocean and warmed by the nearby Gulf Stream. They form our unique habitats known as ocean hardbottoms.

Read and Find Out

- *North Carolina WILD Places: A Closer Look* edited by Lawrence S. Earley, North Carolina Wildlife Resources Commission, 1993.
- *The Hardbottom Distribution/Fishing Map* (poster); also features five paintings of the reefs. N.C. Sea Grant, Box 8605, N.C. State University, Raleigh, N.C. 27695-8605.
- *Hardbottoms: Undersea Oases on the North Carolina Continental Shelf* (video). N.C. Sea Grant, Box 8605, N.C. State University, Raleigh, N.C. 27695-8605.



cocoa damselfish

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

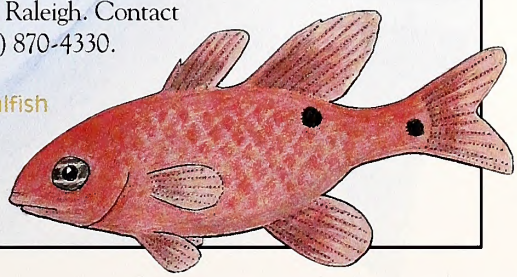
Designing a Habitat: teaches students to identify the components of habitat that are essential for most aquatic animals to survive.

Fashion a Fish: teaches students how adaptations of fish help them survive in their habitat.

Get WILD

Advanced WILD Workshops:

October 12-13 – *Piedmont Habitats*, Blue Jay Point County Park, Raleigh. Contact Blue Jay Point, (919) 870-4330.



two-spot cardinalfish

Editing and design by Consie Powell

New North Carolina Waterfowl Stamp, Print on Sale in July

***"Black Ducks at** Price's Creek Lighthouse" by Ron Louque is the 2001 North Carolina waterfowl stamp and print. Proceeds from sales go toward protecting wetlands habitat for migratory waterfowl.*

The 2001 North Carolina waterfowl stamp and print, featuring a trio of black ducks at Price's Creek Lighthouse, go on sale July 1. Proceeds go toward the preservation of critical waterfowl habitat.

This year's state stamp and print is by Charlottesville, Va., artist Ron Louque, who also painted last year's. Louque has tallied 26 commissions for waterfowl stamps in 20 states.

The 2001 edition of North Carolina's stamp and print is the sixth and final in the Wildlife Heritage series, depicting historical sites that have played a role in the state's waterfowl and hunting traditions.

Price's Creek Lighthouse, near Southport, provides the backdrop for three black ducks—a female in the center and two males—taking wing over an estuarine marsh. In the background, at the edge of the woods, is the 150-year-old lighthouse ruin.

Dating to 1849, Price's Creek Lighthouse was one in a chain of lighthouses along a 25-mile stretch of the lower Cape Fear River. These inlet beacons guided ships upriver from the Cape Fear's mouth, which is overseen by Bald Head Lighthouse, to the port of Wilmington.

The Price's Creek beacon—located just above Southport, and visible from the Fort Fisher ferry—is the only one of those half-dozen river lights that still stands. It was originally one of two beacons that aided navigation of the river's bend at Price's Creek. The other, a 35-foot wooden tower built atop the keeper's house, toppled after a series of storms 100 years ago.

Its surviving companion, a 24-foot brick circular tower, was damaged by retreating Confederate troops in the Civil War. Never repaired, the lighthouse is now privately owned.

Signed and numbered prints of "Black Ducks at Price's Creek Lighthouse" are available for $145 from independent art dealers or directly from the N.C. Wildlife Resources Commission. Call (888) 248-6834, or go on-line to www.ncwildlife.org. Stamps sell for $10 each.

Sales of prints, like the stamps, go to the commission's Waterfowl Fund. Now in their 19th year, the state stamps have raised more than $3 million toward the purchase and rehabilitation of thousands of acres of wetlands.

The Waterfowl Fund has also contributed toward maintenance of wetlands and toward waterfowl research. Stamp-funded projects help North Carolina do its part to implement the North American Waterfowl Management Plan, an international agreement intended to help restore waterfowl populations throughout the continent.

—Brad Deen

State Muskie, Blackfin Records Fall

Edited by Brad Deen

Two North Carolina anglers recently reeled in state record-sized catches—one freshwater, and one saltwater.

Richard Dodd of Black Mountain hooked a 41-pound, 7.8-ounce muskellunge on Jan. 23. Fishing Lake Adger in Polk County, Dodd hooked the 48 1/2-inch muskie using a Storm Big Mack lure.

His catch was certified by the Wildlife Commission's Division of Inland Fisheries. The previous record, which had held since 1994, was 41 pounds.

Also landing bragging rights was Wallace Trayah of Oak Island, who landed a blackfin tuna weighing 34 pounds, 2 ounces on March 24.

Fishing an area known as "The Steeples," about 55 miles offshore from Southport, Trayah caught the 35 3/4-inch record-breaker while trolling ballyhoo with a Zuker blue-and-white lure. The previous state record for blackfin tuna, certified by the state Division of Marine Fisheries, was 34 pounds. It was caught in 1993.

Landowners: Help CURE Grassland Bird Declines

The N.C. Wildlife Resources Commission is seeking landowning partners to help reverse the decline of bobwhite quail and other species that require habitats of tall grasses and brushy vegetation.

A new program called Cooperative Upland Habitat Restoration and Enhancement, or CURE, aims to restore habitats lost to development, forest and altered farming patterns. In three focal areas across the state, the Wildlife Commission is recruiting groups of landowners to form wildlife cooperatives of at least 5,000 acres.

Within these cooperatives, the Division of Wildlife Management will work with landowners to establish a mosaic of tall grasses, weedy growth and brush and similar habitat along ditchbanks, field borders, streamside areas and in open woodlands. Landowners in each cooperative will be provided grants and direct technical assistance.

Applications will be accepted through June 30.

Small farms and frequently disturbed woodlands once provided ideal habitat for 20 to 25 species of birds whose numbers have dwindled, including prairie warblers, field sparrows and meadowlarks. Bobwhite quail alone have declined 80 percent since 1966.

At the same time, fields of tall grasses and scrub—collectively called early succession habitat—have been steadily displaced by large clean farms, closed canopy woodlands and denser human populations.

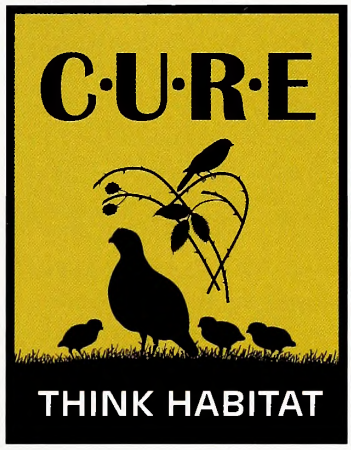
CURE, funded through the commission's Wildlife Endowment Fund, has already established a pilot cooperative in the western Piedmont near Turnersburg. Two additional cooperatives are planned for:

- the northern Coastal Plain —Bertie, Duplin, Edgecombe, Greene, Halifax, Harnett, Hertford, Johnston, Lenoir, Martin, Nash, Northampton, Sampson, Wayne and Wilson counties;
- and the southern Coastal Plain—Bladen, Columbus, Hoke, Robeson and Scotland counties.

Applications will be evaluated for landscape attributes and landowner commitment. Selections for the two Coastal Plain CURE cooperatives will take place in late August.

For more information or to obtain application packets, contact the Division of Wildlife Management at (919) 733-7291.

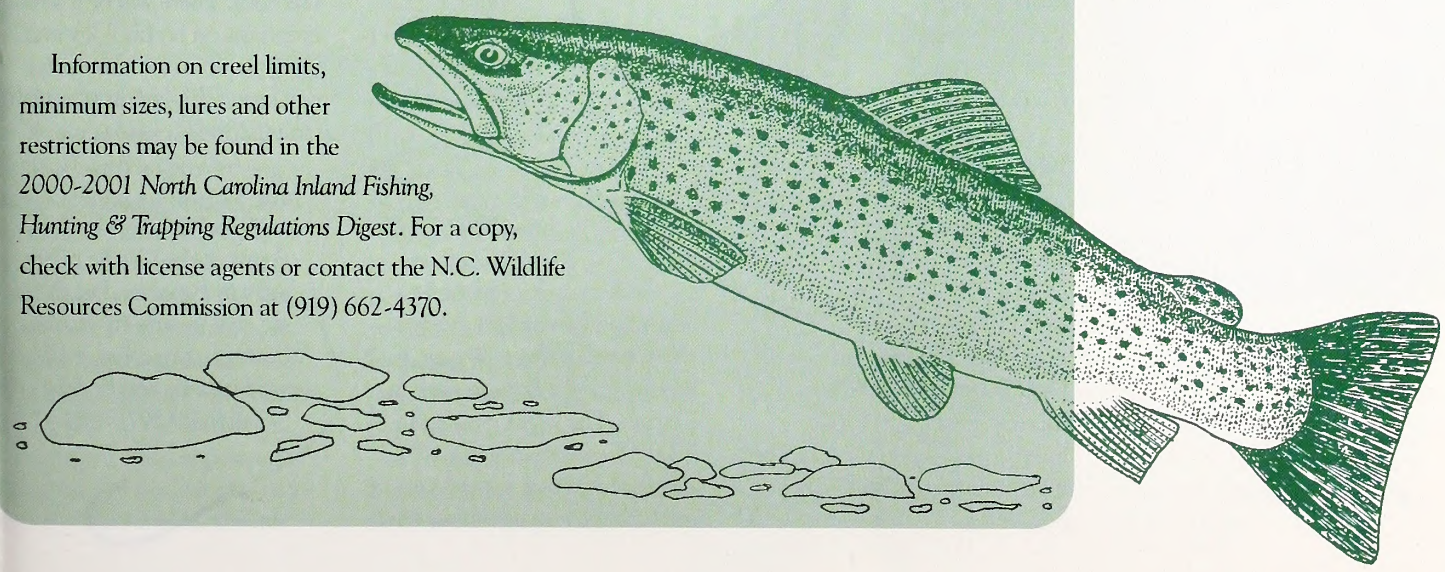
Grants and on-the-ground assistance will be available only to landowners within CURE boundaries. However, technical assistance in establishing and maintaining wildlife habitat will continue to be available statewide as resources allow.



Field Notes

- ◆ Wild Trout Waters – Year-Round
- ◆ Hatchery-Supported Trout Waters (green/white signs) – Open
- ◆ Delayed Harvest Trout Waters (black/white signs) – Open to harvest June 2

Information on creel limits, minimum sizes, lures and other restrictions may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.



On Patrol

Editor's note: *The situation described below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

On the opening day of bear season in Beaufort County last November, Capt. Charles Boahn and Lt. Richard Venable were staking out an illegal bait site. That evening, they saw a man enter the area, scope the bait pile with his rifle, then leave.

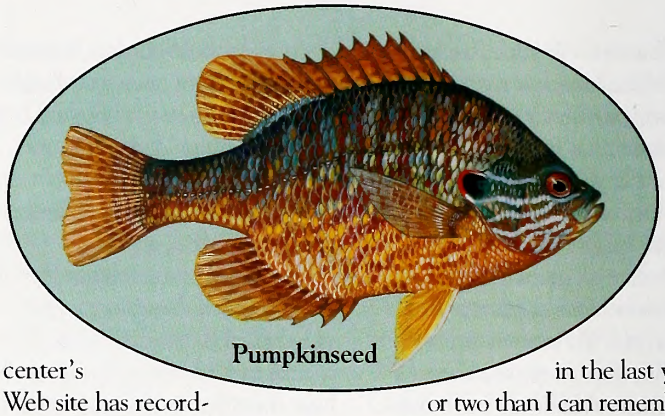
Stopped and questioned, the man admitted baiting bears with peanut butter, grease, animal parts, corn and syrup. But he insisted that he wanted only to observe the bears, not shoot them. The rifle, he explained, was in case he saw a deer.

Not taking the bait, the two seasoned officers wrote him a citation. It wouldn't be their last of the evening.

Venable went to gather his observation equipment. Boahn, waiting at the patrol vehicles, watched a truck drive by the field and highlight it. The driver, upon being stopped, said he had been hunting nearby and was on his way home when he decided to see if any deer were in the field that night.

When Venable returned, he saw a second figure in Boahn's vehicle. He was puzzled until he heard his captain tell him, "Charge this one with night deer hunting."

Duane Raver's Art Available on CD



Pumpkinseed

Retired *Wildlife in North Carolina* editor Duane Raver has had his wildlife art displayed on canvases, posters, T-shirts, hats, calendars—you name it. But on compact discs?

That's right. The U.S. Fish and Wildlife Service has begun to market a disc containing artwork produced in 1975 by Raver for the N.C. Wildlife Resources Commission. The disc features 68 southeastern salt- and freshwater species that can be viewed on a computer.

"It's been really well received," said Elizabeth Jackson, a spokesperson for the National Conservation Training Center in Sheperdstown, W.Va. "The center's Web site has recorded as many as 200 visits a day by people wishing to view the art."

Though his type of wildlife paintings exists outside of mainstream art, Raver said demand for his work remains quite high. "It's never-ending," he said. "I've done more illustrative work in the last year or two than I can remember."

Some of the fish and wildlife artwork can be downloaded free, or the entire set (contained in two CDs) can be ordered online for $10 by visiting www.fws.gov.

—Tom Dillon

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

June 2

A Youth Bank Fishing Tournament for children ages 15 and under will take place in High Point at Oak Hollow Marina. Entry is free, but limited to 200 participants. For more information, call (336) 883-3494.

June 7

Learn about air quality from U.S. Environmental Protection Agency experts during a daylong workshop at the Pisgah Center for Wildlife Education, Pisgah Forest. CEU credit for teachers is available. Call (828) 877-4423.

June 9

River Revival, an outdoor environmental education festival about rivers, will take place from 10 a.m. to 4 p.m. at Lake Benson Park in Garner. The Wake Soil and Water Conservation District event promises live performances, hands-on activities, food and more. Call (919) 250-1050.

June 11-12

A Stream Habitat Study will take place at the Pisgah Center for Wildlife Education, Pisgah Forest. The daylong workshop will evaluate area aquatic habitats using standardized surveying methods. There will be a strong emphasis on technology and its application for classroom teachers. CEU credit is available. Call (828) 877-4423.

June 17

A Father's Day in the Forest at the Cradle of Forestry in America, Pisgah Forest, will feature fly-fishing demonstrations, horseshoes, wood carving and Frisbee golf. Call (828) 877-3130.

N.C. Farming Couple Earn National Conservation Award

A Wilson County farming family has won national recognition for their conservation practices.

Glenn and Barbara Smith received the National Award for Agricultural Landowners for Fish and Wildlife Conservation from the International Association of Fish and Wildlife Agencies. The Smiths accepted the honor at the March 18 meeting of the association in Washington, D.C.

"The Smiths are landowners and farmers—and land stewards, conservationists and wildlife enthusiasts," said Dr. David Cobb, chief of the N.C. Wildlife Resources Commission's Division of Wildlife Management. "They earn their livelihood from the land, and their lands support a vast array of wildlife."

Glenn Smith insisted his farming methods aren't unusual. "A lot of other guys are out there who do the same things. They just never got a pat on the back," he said.

The Smiths were some of the first producers in their area to incorporate numerous wildlife- and habitat-friendly practices into their agricultural operation. Soybeans are planted with a no-till drill; strip tillage is used for cotton; use of Integrated Pest Management and Precision Agriculture reduces pesticide loads and nutrient loss, while increasing crop yields and profitability; and vegetated field borders abound on their lands.

"They're just good farming practices," Smith said. "It's what N.C. State [University] and the Extension Service recommend now."

He and his wife have also contributed significantly to cooperative research into declining bobwhite quail populations in the modern agricultural landscape. They have provided areas for study, modified farming operations to provide replicated treatments and shared their home and experiences with managers and researchers alike.

The Smiths have been honored before for their help in demonstrating that farming and conservation of wildlife, soil and water are compatible. They won the 1998 N.C. Wildlife Federation Governor's Award as Land Conservationists of the Year.

Cobb, of the Wildlife Commission, said the national recognition is much-deserved.

"At a time when commodity prices and land values have many farmers focused solely on the bottom line, with little attention to land health, the Smiths are pursuing a different approach," he said.

—*Brad Deen*

DAVID COBB

Glenn and Barbara Smith, center, *accept their award for agricultural conservation from the International Association of Fish and Wildlife Agencies. Also pictured are Wayne MacCallum, left, chairman of the association's Awards Committee, and Bob McDowell, association president.*

'Take Me Fishing,' Urges Ad Campaign

National Fishing and Boating Week, June 1–10, kicks off with an advertising blitz encouraging anglers and non-anglers alike to get out of the house and onto the water.

"Take me fishing" TV ads, sponsored by the American Sportfishing Association industry group, began airing in March during the NCAA basketball tournament. Also appearing in magazines and in bait and tackle stores nationwide, the ads emphasize the opportunities fishing provides for strengthening family ties and friendships.

The campaign is intended to reinvigorate the stagnant aquatic recreation industry. Although nearly 50 million active anglers spend $38 billion a year on tackle, fishing trips and licenses, participation has not kept pace with population growth.

"We realize that there's fierce competition for people's free time these days," said Mike Nussman, vice president of the association. "It's really just a matter of reminding people that fishing is not only fun, but it's also a wholesome activity that helps families connect with each other and with nature."

More ads were timed to coincide with National Fishing and Boating Week. Radio spots ran from May 26 through June 1. A full-page print ad appeared in the May 27 *Parade* magazine. All ad materials direct audiences to the official Web site, www.nationalfishingandboatingweek.org.

The campaign is cosponsored by the Recreational Boating and Fishing Foundation, a non-profit group funded through the federal excise tax on recreational boating and fishing manufacturers.

The outreach program is part of the larger "Water Works Wonders" campaign, which promotes the personal and environmental benefits of fishing and boating.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online Web site at **www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through February 2001

Principal Balance
$32,061,094.17

Interest Earned
$32,574,620.58

Total Receipts
$64,635,714.75

Interest Used
$21,326,178.04

Fund Balance
$43,309,536.71

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax-deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Recycling with Worms

by Rodney Foushee

Nearly half a million tons of food waste are buried or burned as garbage each year in North Carolina. Using worms, you can reduce this waste by recycling your table scraps.

Besides reducing waste, composting with worms provides an amendment to improve the health of your soil as well as an endless supply of fishing worms. Worm composting requires very little space, labor, cost or maintenance.

To begin worm composting, you will need a worm bin, bedding material, water can, worms and food scraps. A worm bin can be made from a 2-foot by 3-foot wooden box at least 8 inches deep. Or you can use a discarded refrigerator placed on its backside. Drill a dozen ½-inch holes in the bottom of the bin for drainage. Drill additional holes on the upper sides of your bin to provide oxygen, and keep a lid on the bin. For the refrigerator, permanently attach a block for spacing to keep the door open about an inch for safety and improved air circulation. Finally, place the bin on bricks in a sheltered, shady spot to prevent the worms from overheating during the summer and freezing during the winter.

You can use shredded paper, leaves or composted animal manure for worm bedding material. Peat moss also makes an excellent material because it retains water. Add a handful of soil to provide roughage and some crushed eggshells for calcium. Next soak the bedding material thoroughly with water, and then add a few containers of red worms. (Don't use night crawlers because these will not do well in a worm bin.)

Once the worms settle in, dig a hole and add non-meat scraps, then cover with an inch of bedding. Continue to feed your worms at least weekly, and add 2 gallons of water per feeding to keep the bedding moist. To fatten up your worms, mix in a cup or two of chicken starter feed per week. (If your worms begin climbing the walls or bunch up in one area of the bin, the conditions are not suitable. Either add more food or water, or reduce the amount of water.) After a few months, you should have plenty of worm compost and castings for fertilizing your plants. And your worms will quickly multiply, providing plenty of free bait for fishing.

To learn more about composting with worms, contact your county Cooperative Extension Center or visit the following Web site: www.bae.ncsu.edu/people/faculty/sherman/ag473-18.html.

N.C. WILD STORE

NEW!

The latest poster in our Amphibian series with the N.C. Herpetological Society

SALAMANDERS *Part 1*

Hidden along streams, in caves and under vegetation, more than 50 different species of salamanders carry out their unique life cycles in North Carolina. This first poster of a three-part set on North Carolina's salamanders features the 13 species in six families that have lungs or gills. Habitat and life cycle notes accompany a color photograph for each species. This captivating educational poster for school or home fits 24" x 36" stock frames. (The other two posters in this set will be available later this year.)

$6 ITEM CODE P19

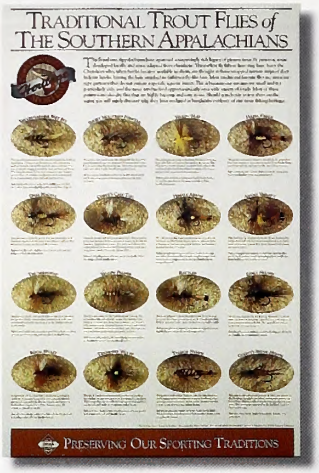
YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

Waterfowl Decoys of North Carolina ▲

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34".

$10 ITEM CODE **P12**



Traditional Trout Flies of the Southern Appalachians ▲

Sixteen traditional trout flies are presented in stunning color detail. Each picture is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34".

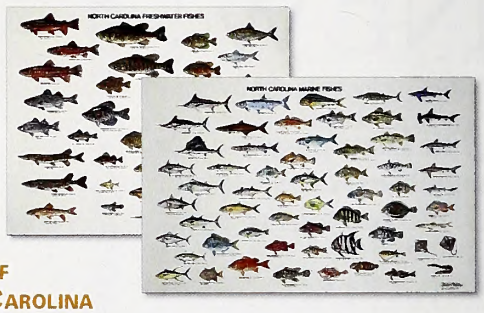
$10 ITEM CODE **P13**

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds

This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. Third in the "Sporting Heritage" series. 22" x 34".

$10 ITEM CODE **P18**



▶ Fishes of North Carolina

Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").

$10 ITEM CODE **P9**

Butterflies Poster Set ▲

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set. Guide also sold separately.

$2 ITEM CODE **M5**

Amphibians: Frogs of North Carolina Poster Set ▶

Set of two posters in full color: The Hylid Frogs & True Frogs and Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom. 22" x 34".

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

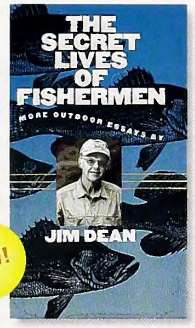
◀ Reptiles of North Carolina

Set of 4 posters in full color.

Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

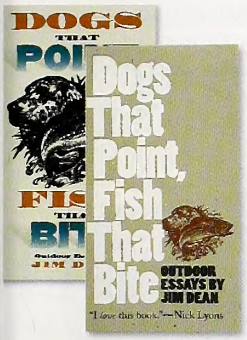
$18 ITEM CODE **P10**

The Secret Lives of Fishermen ▶



NEW!

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound.
$24.95 ITEM CODE **M13**



◀ Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.
Hardbound $19.95 ITEM CODE **M8**
Paperback $10.95 ITEM CODE **M12**

All Things Are Connected ▶

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred teacher's guide, this film is a must-see for everyone.
$22 ITEM CODE **W3**

◀ Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.
$20 ITEM CODE **N9**

Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.
$2 ITEM CODE **M6**

Magazine Binder

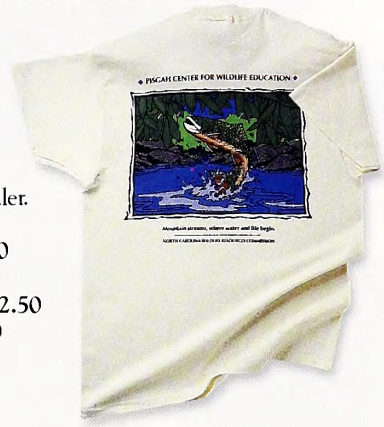
Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.
$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each
Cub & Boy Scout Correlation ITEM CODE **E9**
Girl Scout Correlation ITEM CODE **E10**

Pisgah Center for Wildlife Education T-shirt ▼

100% cotton beige tee with colorful design on back (featured here) and Pisgah logo on front. Adult sizes.
$14.50 ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)



Wee Tees

Just like the adult shirt, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50

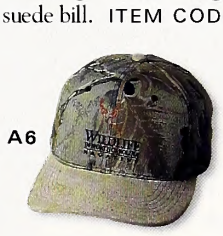
Embroidered Caps

Wildlife in North Carolina Caps ▶
Exclusive designs and magazine logo are featured on four different cap styles.
$16.50 each

A11

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE **A11**
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

A3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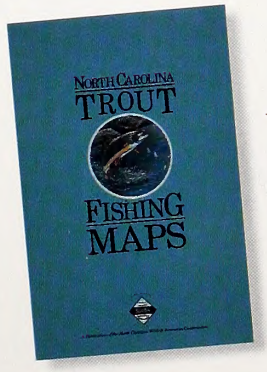

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In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

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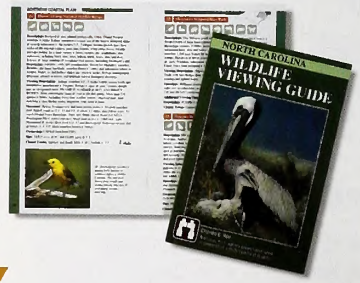

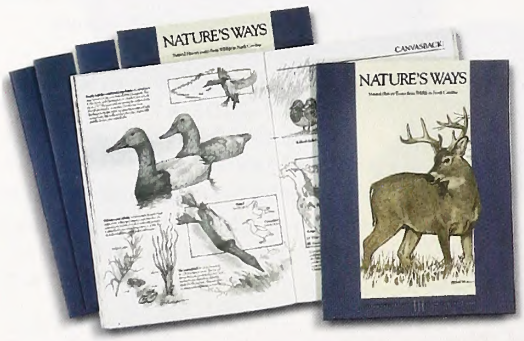

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WILD About Environmental Education?

WILDLIFE COMMISSION SPOTLIGHT

Then, the North Carolina Wildlife Resources Commission has a program that may be just for you.

Designed for adults who work in both formal and informal educational settings, the North Carolina WILD program combines award-winning materials with statewide workshop experiences. The goal of N.C. WILD is to help educators do their jobs. At the same time, it helps learners of all ages develop their personal awareness of wildlife and the environment. By stressing the interdependence among people, wildlife and the environment they share, N. C. WILD serves as a vital tool for teaching about ecosystems, the unity and diversity of life and ecological relationships.

Project WILD, which includes Aquatic WILD, was designed by teachers to be used in all major subject areas in grades K-12 and in college. It has proven to be a valuable resource for teaching science, social studies, language arts, math, art, music, health, physical education, vocational education and special education. In addition, Project WILD and Aquatic WILD can be integrated into existing youth programs such as scouting groups, 4-H and environmental youth camps.

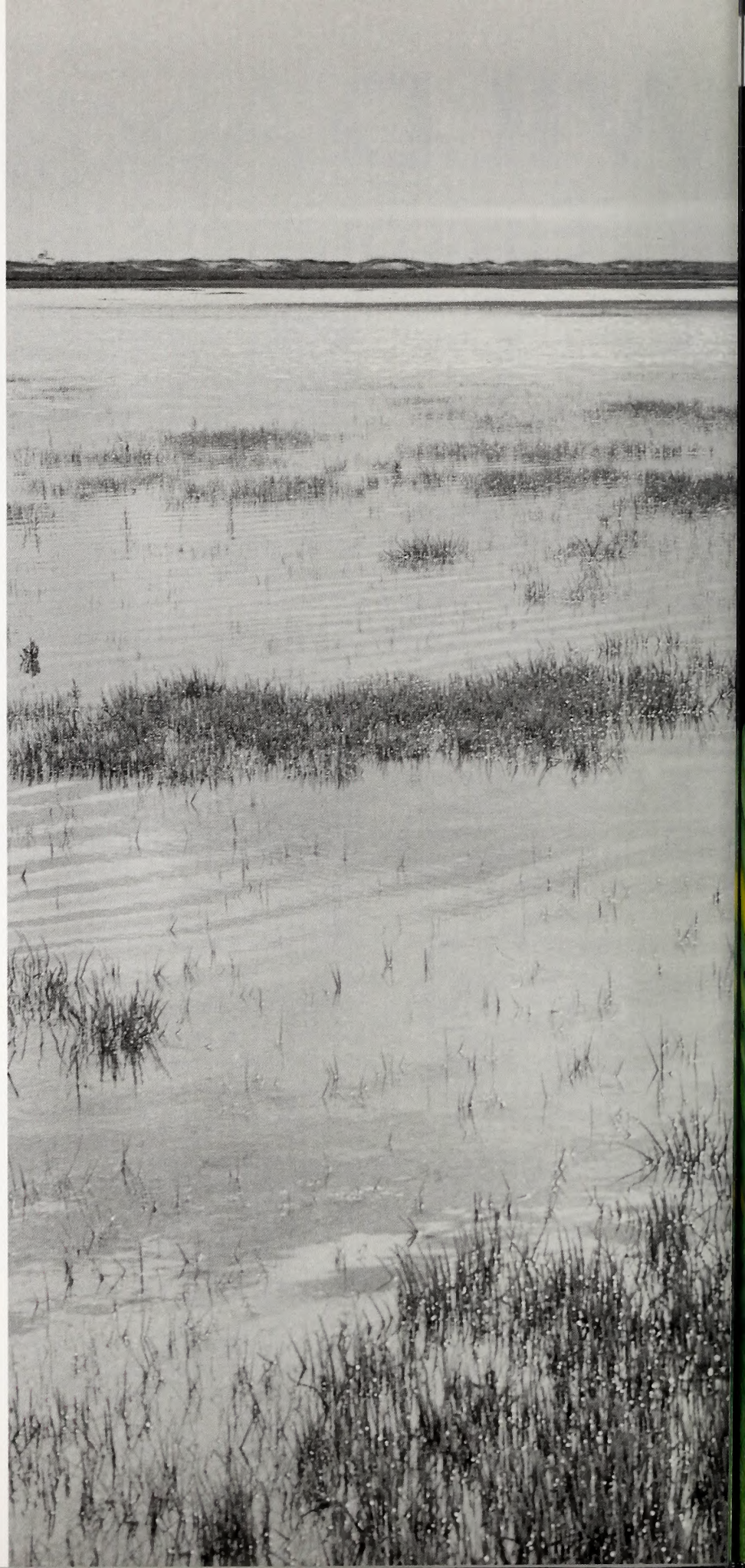
MELISSA McGAW

N.C. WILD training begins with a basic educator workshop, and teachers may receive one CEU credit for a 10-hour workshop. Basic workshops are offered year-round and led by wildlife education professionals.

For more information about the N.C. WILD program, contact B.B. Gillen at (919) 733-7123 Ext. 260.

MELISSA McGAW

Mike Campbell (above) *and Todd Ewing (left), both education specialists with the N.C. Wildlife Resources Commission, teach N.C. WILD participants about various ecological relationships.*



A Place in the Heart

Recollections of wild horses aren't the only fond memories that linger from a visit to Bird Shoal near Beaufort. See page 14 for the story.

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WILDLIFE IN NORTH CAROLINA

JULY 2001 $1.50

The Worm That Turned

by Jim Dean

JIM DEAN

"We've come a long way since those days half a century ago, and modern soft plastics are better than ever."

I'm guessing that every bass fisherman who ever lived has had this fantasy. You have just invented these marvelous lures made of soft plastic, and you're the only angler who has them, or even knows about them. Your boxes are filled with soft worms, salamanders, grubs and similar items in every shape and color. You also have all the modern weights and hooks to use with them. And, somehow, you are able to conceal your secret from all your fishing buddies.

Wouldn't that be something? Everywhere you fish, the bass would be seeing these amazing squirmy offerings for the first time. You'd also be the first angler in history able to fish heavy cover at all depths with only an occasional hang-up. The bass would go nuts. There would be strikes on nearly every cast, and you'd be tossing back whoppers regularly, while your companions would be casting fruitlessly and gnashing their teeth. You'd be an instant fishing legend—if that's what you wanted to be. And if you were inclined to employ your invention on the professional bass tournament circuit, you'd be richer than both the Almighty and Ray Scott (no, they really aren't the same person).

In a way, that fantasy was not too far from reality for those of us who were fortunate enough to be around when the first plastic worms hit the market in the 1950s. Although the first worms and the techniques for using them were primitive by today's standards, they truly revolutionized bass fishing; indeed, all fishing. Oddly, these miraculous lures did not catch on right away.

I can't recall the exact year during the early '50s, but the first plastic worms I ever saw were small, rubbery things made to look like red wigglers. They came several to the package, and were advertised as a non-messy substitute for real worms. You were instructed to thread them on a hook and fish them under a float. Of course, that didn't work, even for bluegills.

But the Creme Company soon followed with longer, natural-colored plastic worms rigged with several small hooks on a monofilament harness. These worms also had beads and a small propeller rigged at the head, and they were designed for bass fishing. They proved immediately successful, especially when their relatively light weight was paired with spinning tackle (also a fairly new invention).

By the late '50s, you could buy worms rigged or unrigged. Color selection was limited, but you had a choice of natural, black, red or grape. By then, anglers had discovered how to rig them by threading a single hook with a weedless wire guard into the head of the worm. Weight was added by pinching a split shot to the line ahead of the worm. It was this combination that launched the modern era of soft plastics, and it was a deadly innovation.

My grandfather and I had been fishing an old millpond in Halifax County regularly for some years when word began to get around about the effectiveness of those first plastic bass worms. We had been using the popular lures of the time—mostly classic wooden, glass-eyed lures—but we also used a variety of metal lures, and Grandpa's favorite was a Johnson Silver Minnow with trailing pork rind. We caught a few bass now and then, but our success was not notable until that day we first rigged some black plastic worms to give them a try.

That seemingly fished-out millpond held more bass than we'd ever imagined. We caught bass all afternoon, and some of them were sizeable. I have an old black-and-white photo of Grandpa playing one humongous largemouth that eventually broke his line.

Our tactics were not much different from those of today. We'd cast against the bank or around an old log, let the worm sink, then twitch it back enticingly. One difference, however, is notable. It was believed then that you had to open the bail of the spinning reel and let the bass run off and swallow the worm to get a good hook set. We let some of those bass run so long that they could have digested the worm. It was not unusual to set the hook and see the bass jump 25 yards away.

Today, we have far more soft plastics, weights, hooks and various styles of rigging and using them. We've also learned that you kill fewer bass if you set the hook quickly. Nor do we use 6-pound mono and noodly, solid-glass spinning rods.

We've come a long way since those days half a century ago, and modern soft plastics are better than ever. But they aren't secret weapons anymore. Sometimes I wish they were, especially if I could get those 50 years back, too.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *The larva of the zebra swallowtail is nearly as striking as the butterfly it will become. Photograph by Jaret C. Daniels.*

N.C. DOCUMENTS CLEARINGHOUSE

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A Little Bit of Texas

written by Jeff Beane
illustrated by David Williams

In a sandy residential area in Onslow County, about 3 miles southwest of Swansboro, there exists a small, but evidently thriving, population of one of the most unlikely vertebrates ever to be introduced into North Carolina—the Texas horned lizard (*Phrynosoma cornutum*).

Also known as "horned toads" or "horny toads," horned lizards are icons of the American West. These spiny, flat-bodied, short-tailed lizards superficially resemble toads (*Phrynosoma* means literally "frog body") but aren't related to them. Eight species are native to North America, all of them west of the Mississippi River. The Texas horned lizard is probably the best known, originally ranging from northern Kansas to central Mexico and from southeastern Arizona to northwestern Louisiana. Its natural range includes most of Texas, where it is the official state reptile.

Unfortunately, the endearing qualities of horned lizards once led to their widespread sale as pets (even though they usually fare poorly in captivity, requiring high temperatures and ultraviolet light, and preferring live ants as food). As a result, they escaped or were released in numerous places outside their natural range. Most such introductions failed. The species was first reported in North Carolina in 1880, when a specimen turned up in Raleigh. Individuals have since been reported from several North Carolina counties, but only the Onslow County colony appears to be an established, breeding one. Scientists first documented that population in 1989, but local residents had reported seeing the lizards for more than a decade prior to that. Small juveniles have been found at the site, indicating successful breeding. Similar small populations are established in portions of coastal South Carolina.

Horned lizards are ground dwellers and move more slowly than our native lizards, relying heavily on camouflage and their spiky armor to avoid predators. They also have the odd habit of occasionally squirting blood from their eyes when stressed—a behavior that apparently repels certain predators. Horned lizards are most active on hot, sunny days, and are frequently found sitting near ant nests, especially those of harvester ants (*Pogonomyrmex* sp.), their primary prey.

Unfortunately and ironically, an introduced ant—the imported red fire ant (*Solenopsis invicta*)—may be turning the tables on this ant-eating lizard. First brought into the United States from South America around the 1930s, fire ants not only consume horned lizard eggs and young but also compete with the native ants that they depend on for food. They are a serious threat to horned lizards (and many other small animals) over much of their native range.

I first visited the Onslow County horned lizard site on a hot June day in 1995. As my companions and I slowly searched the sandy roadsides, yards and vacant lots, three different passersby stopped to inquire about our presence. All three knew about the horned lizards, and one even asked if we were looking for them. Interestingly, however, all related a different account as to how and when they first appeared there. One gentleman claimed to have released them there himself several years earlier, from California. We knew the species did not occur in California but did not dispute his claim to fame (after all, he might have acquired them from a pet shop in that state). We found one specimen that day—an adult female sitting on a harvester ant nest.

Humans seem obsessed with moving animals and plants from one locality to another, and although such introductions often result in ecological and economic disaster, the practice continues to such an extent that people appear unteachable. Fortunately, horned lizards do not appear to be terribly invasive. The single known population has not spread very far. Still, it could impact harvester ant populations or compete with native species like the six-lined racerunner (*Cnemidophorus sexlineatus*), a native lizard that also eats ants on occasion. The Texas horned lizard holds the distinction of being North Carolina's only successfully introduced reptile species (the red-eared slider may have become established in a few places, but another subspecies of that turtle is native to the state). Hopefully, we can refrain from introducing others and focus instead on respecting and protecting our native species and ecosystems.

Jeff Beane is a curator of reptiles and amphibians at the N.C. Museum of Natural Sciences in Raleigh.

Other Reading:

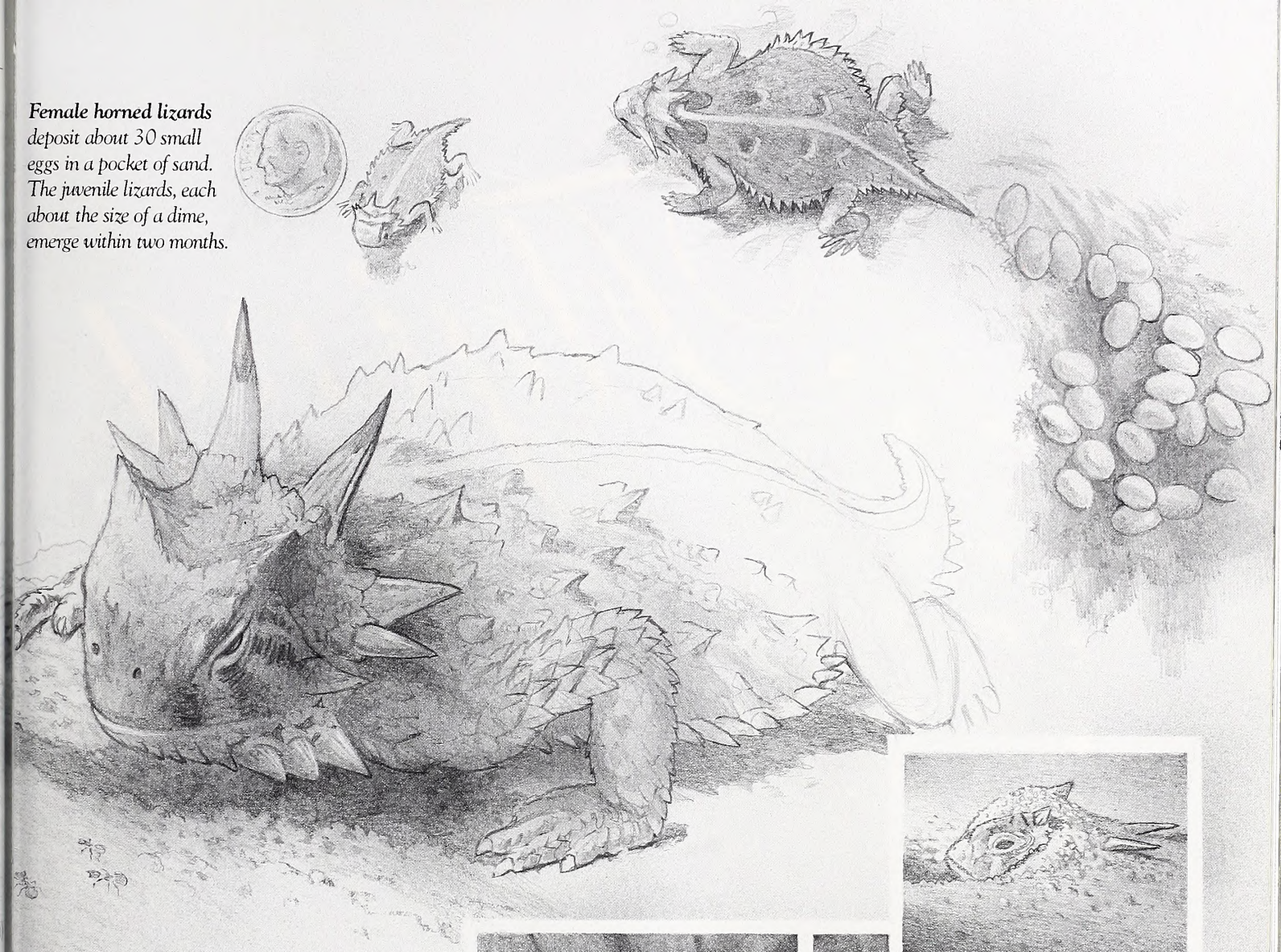
- W.M. Palmer and A.L. Braswell, *Reptiles of North Carolina* (University of North Carolina Press, 1995).
- B.S. Martof, W.M. Palmer, J.R. Bailey and J.R. Harrison III, *Amphibians and Reptiles of the Carolinas and Virginia* (University of North Carolina Press, 1980).
- R. Conant and J.T. Collins, *A Field Guide to Reptiles and Amphibians, Eastern and Central North America* (Houghton Mifflin Co., 3rd edition, 1998).
- L.R. Settle, "Geographic Distribution: Phrynosoma cornutum," *Herpetological Review* 1989 (vol. 20, no. 1, p. 12).
- W.L. Donaldson, A.H. Price and J. Morse, "The Current Status and Future Prospects of the Texas Horned Lizard (*Phrynosoma cornutum*) in Texas," *Texas Journal of Science* 1994 (vol. 46, no. 2, pp. 97-113).

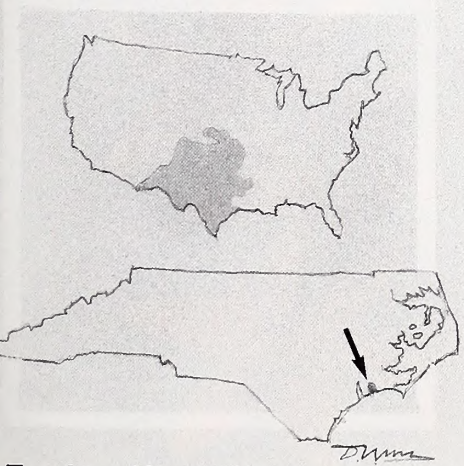
Surfing the Web

These Web sites include information on and images of Texas horned lizards:

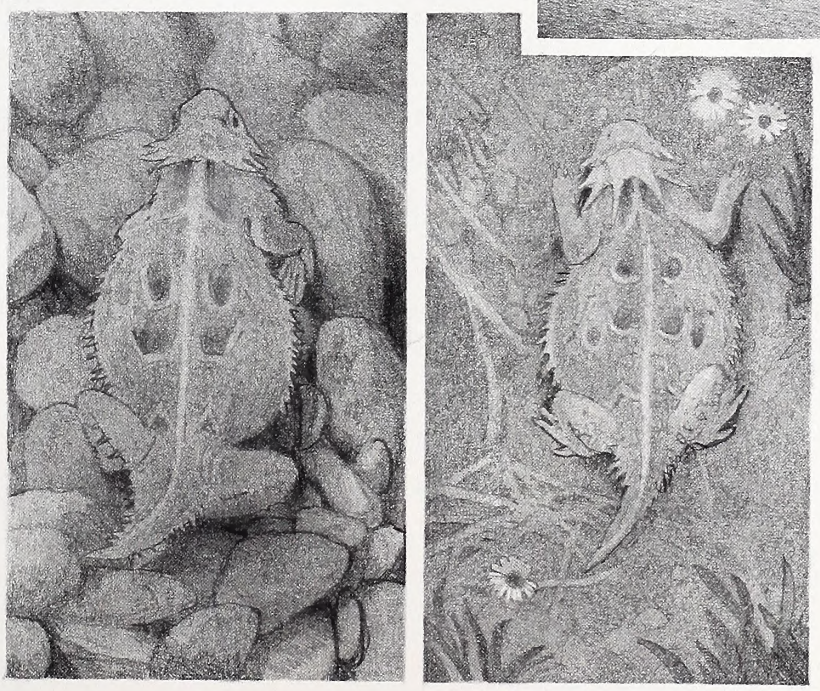
- uts.cc.utexas.edu/~iffp475//phrynos_html/cornutum.html#top
- coloherp.org/geo/species/spephco.html
- www.arts.arizona.edu/herp/lizard13.html
- www.lifesci.utexas.edu/research/txherps/lizards/phrynosoma.cornutum.html
- sevilleta.unm.edu/data/species/reptile/socorro/profile/texas-horned-lizard.html
- www.tpwd.state.tx.us/nature/wild/reptiles/thlizard.htm

Female horned lizards *deposit about 30 small eggs in a pocket of sand. The juvenile lizards, each about the size of a dime, emerge within two months.*

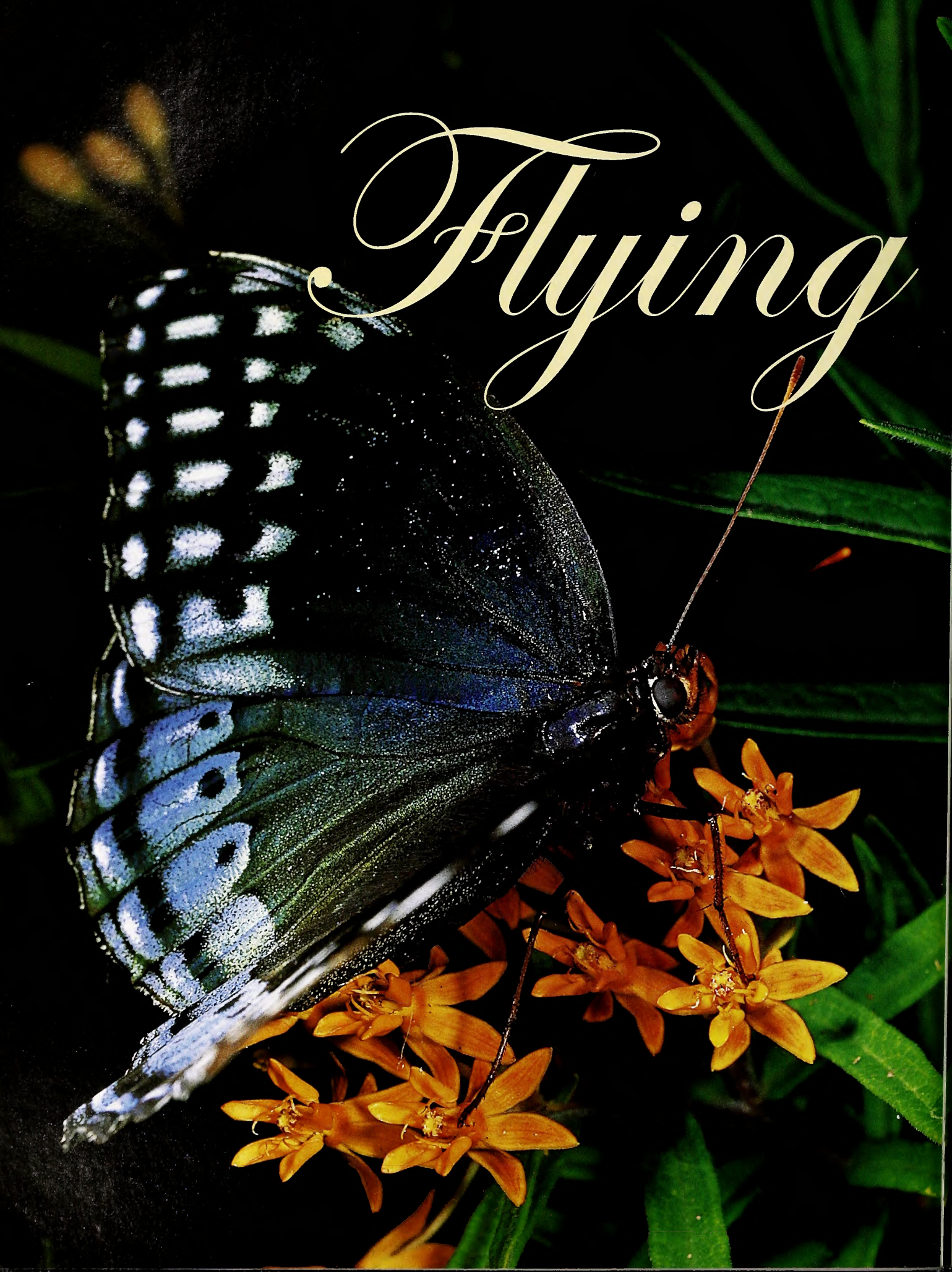




The Texas horned lizard (Phrynosoma cornutum) *is the only non-native reptile species to have established a breeding population in North Carolina. Originally found in Texas, the lizard has established itself in a small area of Onslow County.*



Slow-moving, horned lizards rely on camouflage *and spiky armor to avoid predators. The lizards can also squirt blood from the corners of their eyes to ward off certain predators.*


Flying

Jewels

written and photographed by Jaret C. Daniels

From the mountains to the coast, North Carolina supports a dazzling array of butterfly species, ready for your enjoyment.

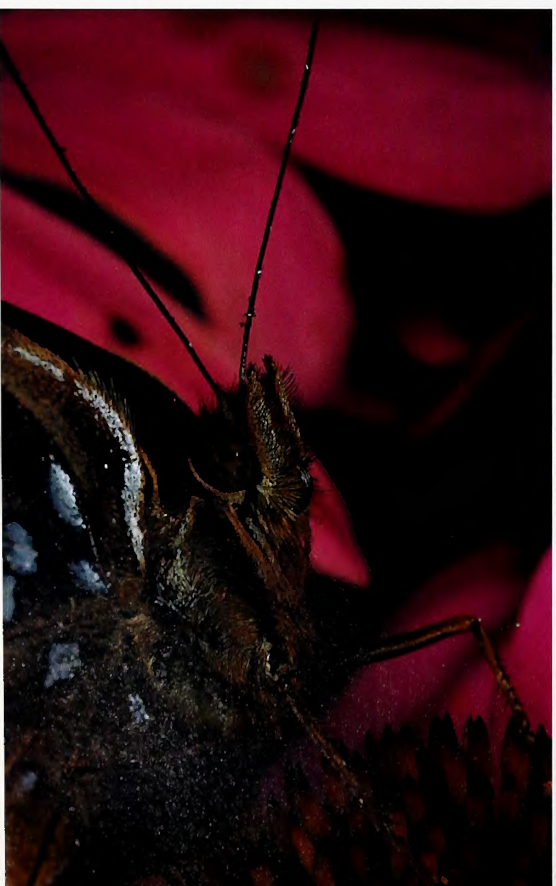
Last August my wife and I sprang for a quick weekend getaway and ventured into the Pisgah National Forest. The dwindling days of summer are a wonderful time in the western North Carolina mountains. The days are warm, and the roadsides are ablaze with colorful wildflowers. For a nature photographer, though, it's also a time to exercise some semblance of self-control. Wildflowers may make great captive subjects, but they were not on the ticket this weekend. My sights were set on more elusive targets—butterflies.

With more than 160 species documented in the state, butterflies top the list as one of North Carolina's most watchable forms of wildlife. It doesn't take a seasoned naturalist to realize that butterflies come in a carousel of colors, shapes and sizes other than the familiar, orange-and-black monarch (*Danaus plexippus*). Whether enjoyed through the naked eye, binoculars or a camera lens, butterfly watching affords much of the same pleasures as bird watching. And you don't have to get up at the crack of dawn to partake.

Additionally, the state's tremendous habitat diversity makes it a bonanza for butterfly enthusiasts. Traveling from the Appalachian mixed-hardwood forests to the sun-drenched wetlands of the Coastal Plain, you can readily find a variety of both northern species and subtropical immigrants. Here are just a few of our flying jewels.

***Few species are more** sought after by butterfly watchers and photographers than the Diana fritillary (female at left). Imposing in both size and color, the species is only found in rich, mountain forests.*

A true southern beauty, *the Palamedes swallowtail (above) can be found in lowlands on the Coastal Plain. By contrast, the great spangled fritillary (below) is found in open fields from the Mountains to the Piedmont.*



Swallowtails

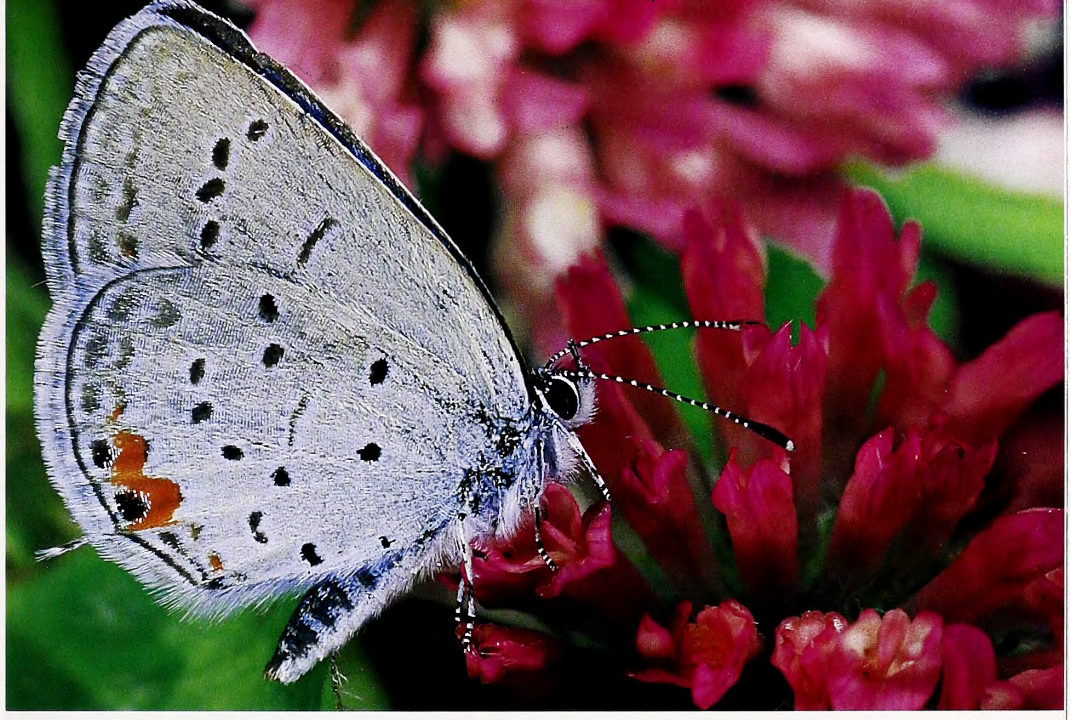
By far the most impressive butterflies commonly encountered are swallowtails. Featuring pronounced hind-wing tails, swallowtails are large butterflies with a powerful flight and a fondness for colorful flowers. All of the state's seven species can readily be attracted to the home garden.

Of those, the eastern tiger swallowtail (*Papilio glaucus*) is considered by many to be the most beautiful. Named for its bold black-and-yellow stripes, the species is equally at home in rich deciduous woodlands or urban parks. Although widespread and often abundant, the butterfly has dramatic size and color that make every sighting a real knockout.

With a wingspan approaching 6 inches, the giant swallowtail (*Papilio cresphontes*) is the largest butterfly in the Carolinas. Its rich chocolate-colored wings are attractively marked with broad, yellow bands. Generally found in and along coastal woodlands, pine flatwoods and thickets, the species has a rapid, directed flight and can be a difficult creature to identify on the wing. Luckily, the giant swallowtail readily stops at flowers. Like many swallowtails, it continuously flutters its wings. This helps it gain access to the nectar in a wide variety of flowers, including many that otherwise couldn't easily support the butterfly's weight.

What the zebra swallowtail (*Eurytides marcellus*) lacks in wingspan, it more than makes up for in whimsical elegance. Adults sport black-and-white-striped wings and a pair of tremendously long, narrow tails. Zebra swallowtails have a low, darting flight and dance among the understory vegetation like winged fairies. The species has a proportionately short proboscis and is unable to feed at many long, tubular blossoms. It instead prefers composites and is attracted regularly to white flowers. The area around Phelps Lake, in Washington and Tyrrell counties, leads the nation in sightings of adult zebra swallowtails during annual butterfly counts held around July 4. Regardless of its relative abundance, this species remains one of my all-time favorites.

Relegated to the state's lowland Coastal Plain, the Palamedes swallowtail (*Papilio palamedes*) is a true southern beauty. It is a large butterfly with velvety black wings and creamy yellow markings. Although quite common in moist woods and swamp forests, it frequently invades residential gardens in search of nectar. The Palamedes is often superficially confused with the smaller black swallowtail (*Papilio polyxenes*) or the darker spicebush swallowtail (*Papilio troilus*), with which it flies.



Despite its small size, *the showy eastern-tailed blue (right) can grab the attention of any butterfly enthusiast. The caterpillar of the eastern tiger swallowtail (below), meanwhile, has false eyes to ward off potential predators.*

Little Gems

Size and beauty do not necessarily go hand in hand. Although large butterflies commonly steal the show, there are many more diminutive species that deserve equal attention.

The eastern-tailed blue *(Everes comyntas)* is a visual stunner in a small package. Although relatively abundant in most open, disturbed areas (as well as in gardens), this tiny gem often goes overlooked. The eastern-tailed blue is silvery white below and sky blue above, with a noticeable white wing fringe and two short, hairlike tails. It is fond of butterfly weed, joe-pye weed, clover and other short-tubed flowers.

The red-banded hairstreak *(Calycopis cecrops)* is one of the state's most colorful residents. Colored in gray, it has a broad red stripe that runs through the wings below and blue patches on the upper wing surfaces that flash in the sunlight during flight. Each hind wing bears two small, hairlike tails that resemble antennae and help deflect predators away from its vulnerable body. The red-banded hairstreak is most common along forest edges and shrubby areas, where its caterpillar hosts on wax myrtle and sumac.

Easily observed as well is the little yellow *(Eurema lisa).* Scarcely larger than an inch across, the butterfly is at home in most open, sunny habitats including utility line easements, roadsides and old fields. The little yellow displays striking seasonal color variation, common in many sulphur species. As fall approaches, the undersides of newly emerged adults deepen dramatically in color and explode with various subtle markings, as

***With gaudy colors** and ornately patterned wings, the American lady (left) might appear to be wearing makeup.*

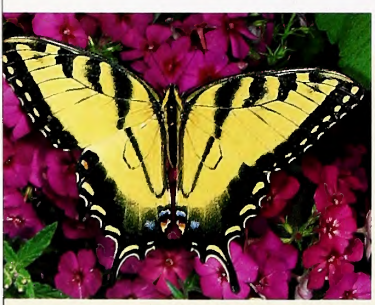
well as a beautiful pink wing fringe. Unable to survive freezing temperatures in any life stage, the little yellow dwells year-round throughout much of the Deep South, the Caribbean and Central America. Nonetheless, the species annually establishes breeding colonies as far north as the Upper Midwest.

One of the most diverse families of butterflies within the state is the brush-foots (family Nymphalidae). Named for a pair of modified legs that resemble small brushes, members typically possess robust bodies, a powerful, darting flight and a somewhat thickened proboscis. Many brush-foots rely on other forms of nourishment besides flower nectar. Dung, carrion, tree sap and rotting fruit are regular delicacies for them.

With ornately patterned wings and gaudy colors, the American lady (*Vanessa virginiensis*) truly appears to be wearing makeup. Its orange-and-black wing surfaces closely resemble those of the related painted lady (*Vanessa cardui*). The hind wings beneath, though, are adorned with a white cobweb design and two large eyespots. Look for the American lady's tiny green eggs on the leaves of cudweed, pearly everlasting and pussy toes. Developing larvae construct shelters on their hosts by pulling leaves and other plant parts together with silk and feed solitarily inside. Adults can be wary and territorial—readily flying when approached, only to return moments later. But they can also appear in abundance on sunny, disturbed sites with at least some bare ground.

At home in the same habitat is the impressive common buckeye (*Junonia coenia*). The species' large, target-shaped eyespots make it one of the most easily identified butterflies in the country. The wings below vary in color and pattern based on environmental conditions. Larvae exposed to long days and warm temperatures produce summer-form adults with heavily marked tan to light-brown wings. Adults emerging in fall are reddish-brown with few visible pattern elements. Like the American lady, the common buckeye has a nervous disposition and a low, darting flight that make it a challenge to view. A close examination requires great patience. The larvae are relatively easy to spot. When not feeding, they tend to rest high on the flower stalks of plantain, toadflax and false foxglove, making them visible at some distance.

Color by Gender



EASTERN TIGER SWALLOWTAIL (MALE)

EASTERN TIGER SWALLOWTAIL (FEMALE)

Appealing to many butterfly watchers are the differences between males and females of the same species.

The Diana fritillary presents a striking example of sexual dimorphism. Males are dark above with wide, brilliant orange wing borders. The female's wings are iridescent purplish black with brilliant blue patches along the outer margin. The dark colors of the female mimic the toxic pipevine swallowtail (*Battus philenor*), gaining it protection from predators.

Also mimicking the pipevine swallowtail are female tiger swallowtails. Females of the species may be either yellow or black. Males, by contrast, are always yellow.

The little yellow does not disappoint butterfly watchers fascinated by sexual dimorphism. Males are butter yellow above with black wing borders. The upper wing surfaces of females may be either pale yellow or white.

Other species' variations are less a matter of color. Female common buckeyes, for example, simply have broader wings and larger hind-wing eyespots than the males.

Abundant Skippers

Appearing to most people more like moths than butterflies, skippers (family Hesperiidae) are easily overlooked, yet they account for nearly 40 percent of the state's butterfly species. They tend to be rather small, dull-colored creatures with robust thoraxes, wide heads and a rapid, darting flight. Skippers differ from all other butterflies by having tapered hooks on the end of their club-like antennae.

Bucking the norm, the giant yucca skipper (*Megathymus yuccae*) lives up to its name by being the largest hesperid in the Southeast. With a huge body and powerful flight, it is one of the few butterflies whose rapid wing beats make an audible whir when one flies past. Encountered in coastal dunes and pinelands supporting yucca, it is an uncommon species and a prize among butterfly watchers. Producing only one spring generation each year, adult activity is confined to a narrow window from late March to mid-May in most locations. Females deposit eggs singly on the leaves of yucca.

Equally showy, but considerably more common is the long-tailed skipper (*Urbanus proteus*). Resembling a diminutive swallowtail, this primarily tropical species is easily identified by its long hind-wing tails. The upper wing surfaces have an iridescent greenish sheen that is particularly stunning when caught in bright sunlight. Abundant later in the season, these skippers can be found in most open, disturbed sites as well as home gardens where they readily visit flowers.

Rare Jewels

Few species are more sought by butterfly watchers and photographers than the resplendent Diana fritillary (*Speyeria diana*). Imposing in both size and color, the species is encountered only in rich, mountain forests. Diana fritillaries favor sunlit patches along streams and dirt roads where wildflowers are present. The large blossoms of milkweed and joe-pye weed are particular favorites. Adults are on the wing from late June to September, with males emerging considerably in advance of females. Nonetheless, multiple close sightings in a single day are rare. Patience, persistence and location are critical for viewing this remarkable butterfly.

Once considerably more widespread, the Diana fritillary has dwindled in number and range due to habitat loss and is now of conservation concern. Currently two main population strongholds persist. One occurs in the Ozark Mountains of Arkansas, and a second, larger population can be found within the southern Appalachians from northern Georgia through North Carolina to central West Virginia.

Listed in 1994, Saint Francis' satyr (*Neonympha mitchellii francisci*) is the state's only endangered butterfly and one of the rarest and least known species in the nation. A southern subspecies of Mitchell's satyr and superficially similar to the beautiful Georgia satyr (*Neonympha areolatus*), it is a small brown butterfly with a slow, somewhat bobbing flight. The wings beneath are adorned with attractive reddish bands and a row of tiny but conspicuous eyespots. Represented only by a single metapopulation occupying a geographic range of a few square miles, the Saint Francis' satyr inhabits sedge-dominated wet meadows within the protected confines of Fort Bragg. Unfortunately, little detailed information is available on the species' life history, ecology, behavior, specific habitat requirements or population dynamics; and its future remains uncertain.

Yet, for most species, there is room for much optimism. Butterfly watching, gardening, amateur study and overall awareness are currently at tremendous levels of popularity nationwide and showing no sign of tapering off. Even more exciting, insects—particularly butterflies—are starting to replace large vertebrates as regular conservation icons and flagship species. So join the crowd and go enjoy these fascinating creatures. ⊠

To learn more about North Carolina's butterflies, consider the posters on page 38.

Colorful Caterpillars

Butterfly larvae can be as colorful as the adults into which they will metamorphose.

For example, stubby caterpillars of the zebra swallowtail — hatched from small green eggs laid singly on the leaves of common pawpaw — display several color forms ranging from green to charcoal.

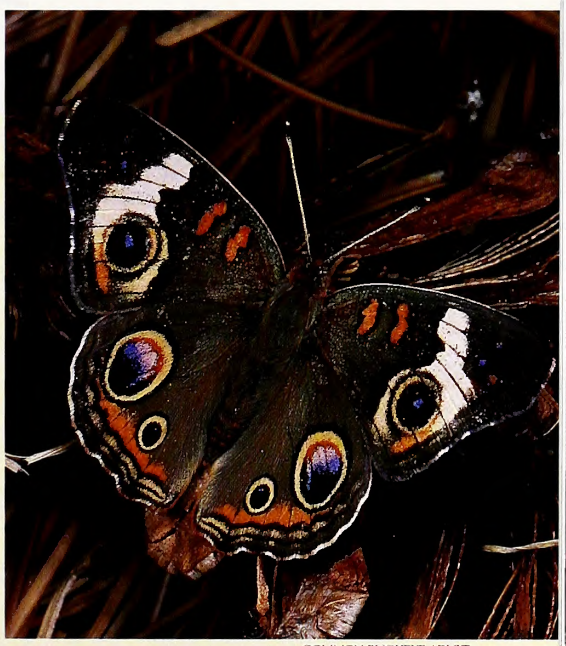
Others can match their adult forms for radiant beauty. Mature caterpillars of the American lady, for example, are black with transverse, cream-colored bands and two rows of white spots on the back. Each body segment bears several branched spines that have a red base.

The attractive larva of the common buckeye is mostly black with lateral white stripes and orange patches. A series of iridescent, blue-black, branched spines adorn the body. Buckeye larvae are relatively easy to spot. When not feeding, they tend to rest high on the flower stalks of plantain, toadflax and false foxglove.

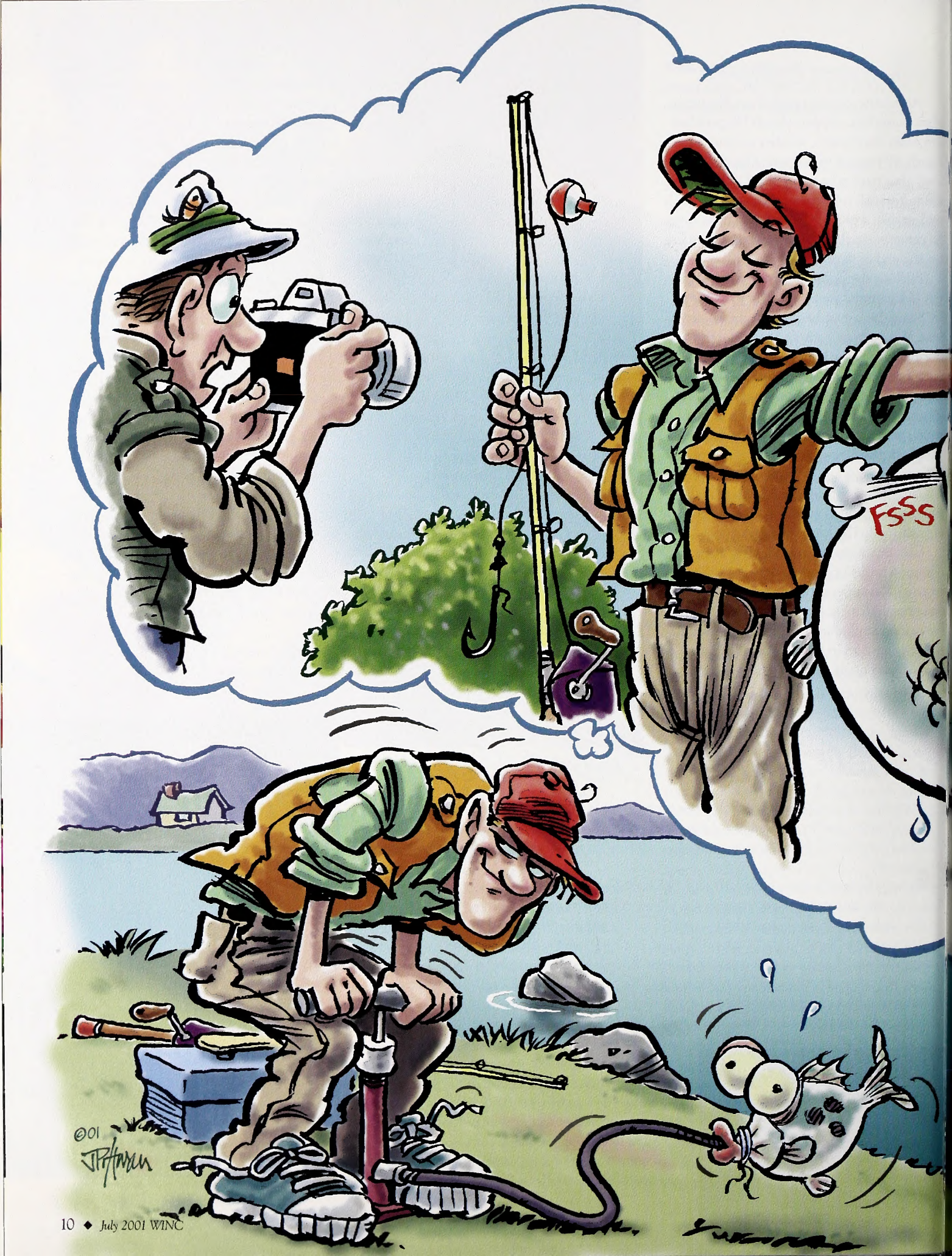
Some caterpillars appear to have adapted their distinctive markings as protection from predators. The Palamedes swallowtail's larva has an enlarged thorax and two very noticeable false eyes. Aside from their comedic appearance, these features resemble the head of a lizard or a snake. A hungry bird may reconsider this would-be meal that might just bite back.

More bizarre are the larvae of the giant swallowtail, which are brown with yellow and cream patches. This unique color pattern, coupled with a behavior of preferring to sit on leaf surfaces, allows them to masquerade masterfully as distasteful bird droppings.

COMMON BUCKEYE LARVA



COMMON BUCKEYE ADULT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How BIG was that fish?

written by David Hart
illustrated by Jackie Pittman

Fishermen have likely been adding ounces, and even pounds, to the weights of their catches since the invention of the hook.

Call it wishful thinking, eternal optimism, blissful ignorance or a simple attempt to make ourselves out to be just a little better than we really are, but most of us add a little weight to the fish we catch. Or maybe we add a lot of weight. A 6-pound largemouth suddenly becomes an 8; a 3-pound smallmouth gets rounded up to a 5-pounder out of generosity; and a 12-ounce crappie turns into an even pound. If we're lucky, we'll be with a partner who not only refuses to question our inaccurate estimate but also wholeheartedly supports it and perhaps even tries to bump the weight up even more. Call him an enabler, a perfect fishing partner or just plain blind.

Hey, it's only human nature. Why not, we figure? As for our friend who agrees with our wildly inaccurate guess, he's only banking on a little help for the ones he catches.

Ed Zern, longtime humor writer for *Field & Stream*, noted in his classic book *To Hell With Fishing* that fishermen are born honest, but they get over it.

"When a fisherman is going to tell you about the big muskie he caught, he knows you will subtract ten pounds to allow for his untruthfulness, so he adds ten pounds to allow for your subtraction. The other ten pounds he adds on account of being such a liar and then adds another five pounds for good measure because what is five pounds more or less on such a big fish," he wrote. "As a matter of fact, he didn't even catch that muskie. He found it floating belly up."

Such additions and subtractions have been taking place since long before you and I began fishing, and it's a fair bet that even our Neanderthal ancestors played these numbers games with their clansmen. How could they prove each other wrong?

Truth is, judging the size of a fish isn't an easy thing to do. Whether it's an 8-inch brook trout (9, maybe?) or a striped bass that might go somewhere in the neighborhood of 30 pounds—OK, 35—few people can accurately guess the size of their catch.

"Most people are way off when they estimate the size of a fish. My clients almost always overestimate, but you can be sure I don't correct them," says Pittsboro guide and tournament angler Mike Dinterman. "One time a couple of guys came up to us in a boat and asked if we had a scale. They said they just caught one that had to be 10 pounds."

But when the two anxious anglers wrestled the fish from their livewell, Dinterman knew the bass probably wouldn't break 6 pounds.

"When they put it on my digital scale and saw that it weighed only a little over 5, they assumed my scale was broken," he recalls. "It wasn't."

Even Dinterman has trouble guessing the weight of a big largemouth, mostly because he doesn't get a chance to weigh many, the same reason we all misjudge the size of a large catch. As with most everything, judging a fish's weight takes practice, lots of it. Dinterman has the smaller bass down to an exact science, however. He sees so many 1- and 2-pounders that he can call their weight accurately to within a few ounces, a skill vital for fishing tournaments.

"You have to remember that water tends to magnify things, too," he notes. Maybe that's why fish tend to shrink as they get closer to the boat.

For the sake of honesty, tackle manufacturers have for decades offered products to help us figure the weight of our catch a little more accurately than the thumb scale attached to our hands. (That's when you grip the fish by its lower jaw with a thumb and forefinger and slowly hoist it up and down a few times at arm's length while studying the length, girth and size of the head in relation to the rest of the body. After a few seconds, you proclaim its weight as if God Himself were a witness.) Thumb scales, however, tend to overestimate fish.

"Lizzie Grieg, gal fly tier of the Angler's Roost, was born in Scotland on the River Tweed," wrote Zern. "It was too late at night to borrow the greengrocer's scale so they used the one her father used for salmon. She weighed 17 pounds, 5 ounces."

Remember ZEBCO's old standby? They didn't call it a De-Liar for nothing. But those old spring-loaded scales weren't the most accurate pieces of equipment, particularly after a few years of lying idle in the storage bin in your boat or among the salt-impregnated baits in the bottom of your tackle box.

They eventually came to be replaced by more technologically advanced scales. Now we have digital readouts that still rely on springs but add another minor complication to the whole process of weighing fish—batteries. Sure, the old Energizer may keep going and going, but it always seems to quit when you catch the biggest bass of your life.

According to Dinterman, the most overestimated bass tend to be those that fall between 3 and 4 pounds. They measure about 17 or 18 inches and have a nice round belly and eyes that are starting to bulge like those huge bass we see on so many magazine covers.

"Just about everybody calls those 3-pounders 4, 5 or 6," he says.

To help reduce the risk of error, particularly if it's an error in favor of the fish, Dinterman occasionally calibrates his scale by hoisting a

5-pound weight and reading the numbers.

"It's off by 2 ounces, which isn't much when you are talking about 5- to 10-pound bass, but I know how much to add, so I can count on what it reads," he says.

Such devices aren't cheap, however. Digital scales can cost 30 or 40 bucks. One well-known gripper-type scale, which also serves as a fish-landing tool by latching onto the lower jaw of the fish in place of your fingers, costs more than $100. That's a lot of money to find out that your 5-pounder really weighs only 3.

There are other accurate ways to determine the weight of your catch, and none of them involves a hundred-dollar scale, a team of Ph.D.s or your best friend's lowball estimate of your catch.

The chart below comes from data on Jordan Lake largemouth bass, accumulated by North Carolina Wildlife Resources Commission fisheries biologists. The weights for each length are averages based on several years of research and dozens, even hundreds, of bass.

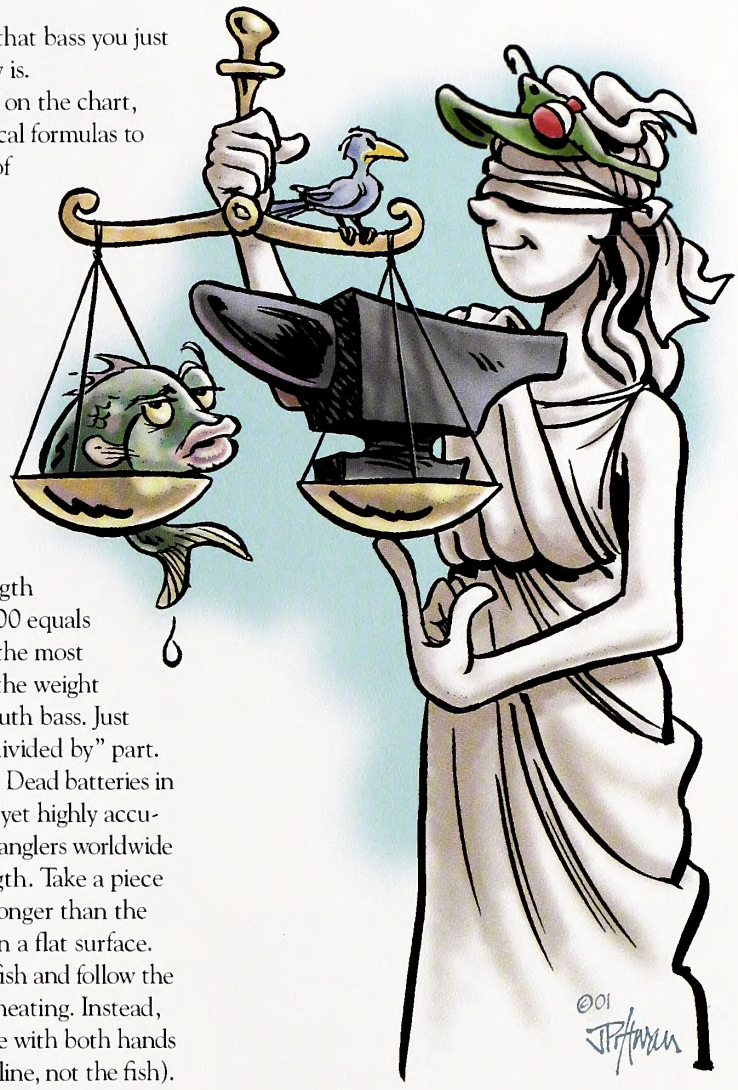
The problem with such charts, admits Scott Van Horn, the Wildlife Commission's Piedmont fisheries research coordinator, is that there is plenty of room for variation, particularly as fish get larger. Twenty-two-inch largemouth bass, for example, have a pretty wide weight range, from as little as 5 or 6 pounds on up to as much as 10 pounds. Van Horn recalls a 22-inch California bass that weighed nearly 20 pounds. Largemouths that live in tidal rivers tend to be much stockier than their lake-bound counterparts, as well.

Still, Tar Heel bass are relatively consistent from lake to lake, so these data should serve as good indicators of how heavy (or, if your friend caught it, how light) that bass you just scooped up in the net really is.

If you don't want to rely on the chart, there are simple mathematical formulas to help determine the weight of your catch, and these have been found to be quite accurate, says Van Horn. Of course, you need a tape measure, a notepad and a calculator, but what angler doesn't carry those in his shirt pocket, anyway?

One—length times length times girth divided by 800 equals weight—is good for all species of fish. Another—length times length times length divided by 1,600 equals weight—is supposed to be the most accurate way to determine the weight of largemouth and smallmouth bass. Just remember to include the "divided by" part.

Forget the tape measure? Dead batteries in your scale? There's an easy yet highly accurate method used by honest anglers worldwide for determining a fish's length. Take a piece of monofilament or string longer than the fish, pull it taut and lay it on a flat surface. Don't lay the string on the fish and follow the curve of the body. That's cheating. Instead, gently lay the fish on the line with both hands while stretching it tight (the line, not the fish). You'll need two more hands to keep the string from moving. Have a third person cut both ends of the line at the tail and the nose of the fish, and then put the section of line somewhere safe, perhaps in the bottom of your boat. Repeat that process several times and keep the longest piece of monofilament. ⊠



Estimating Largemouth Bass Weights

length in inches	weight pounds	ounces	length in inches	weight pounds	ounces
12	1		18	3	9
12 1/2	1	2	18 1/2	3	15
13	1	4	19	4	4
13 1/2	1	7	19 1/2	4	10
14	1	10	20	5	
14 1/2	1	12	20 1/2	5	7
15	2		21	5	14
15 1/2	2	4	21 1/2	6	5
16	2	7	22	6	13
16 1/2	2	11	22 1/2	7	5
17	3		23	7	14
17 1/2	3	4	23 1/2	8	7

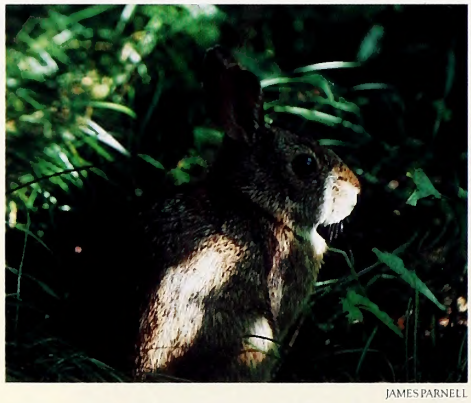
Though nothing can replace an accurate scale, this chart represents average weights of largemouth bass of various lengths collected over several years from Jordan Lake by fisheries biologists. (Note: weights vary the most for the larger fish.)

Source: Division of Inland Fisheries

IN MANY CASES THEY ARE NORTHERN SPECIES MAROONED in the South, the descendants of boreal flora and fauna brought here by glaciers advancing southward eons ago. For centuries they have been chased to ever-higher ground—first by a warming climate that melted the glaciers, more recently by humans and other competing species. Today, North Carolina's high country is home to plants and wildlife you won't find anywhere else in the state.

Many face threats from air pollution, insect infestation, development and more. Their future is uncertain, but they aren't yet doomed, as long as we continue to seek an understanding of their needs and apply management methods accordingly.

Here's a look at a few of the many creatures that contribute to the unique and fragile mosaic of life in our mountains.



JAMES PARNELL

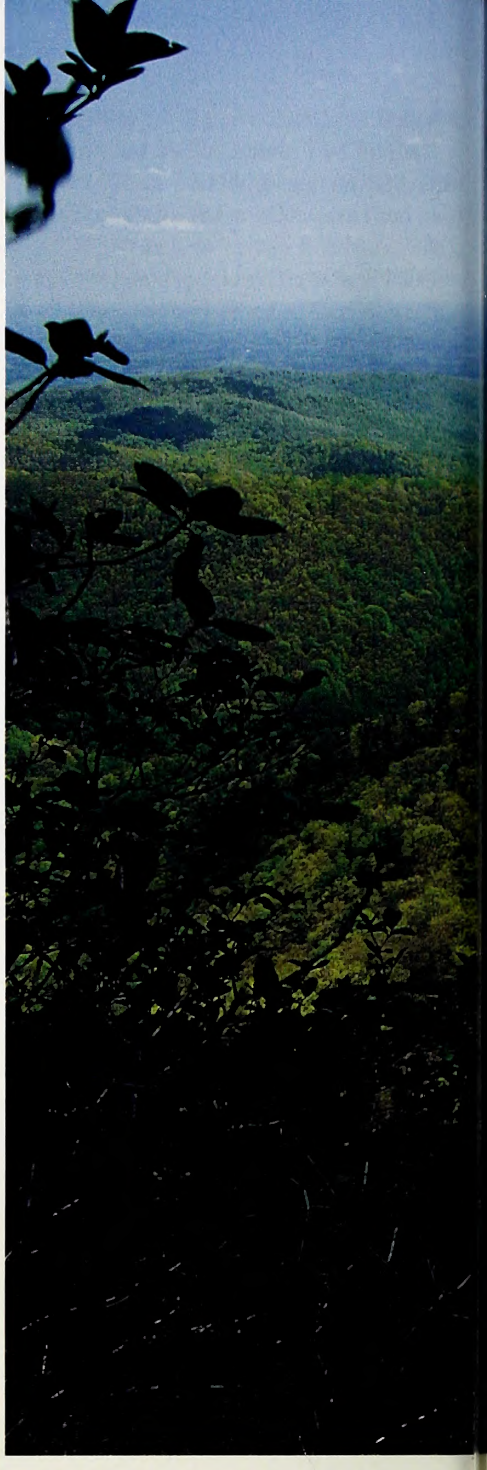
***The Appalachian cottontail** (above), also called the "woods rabbit," prefers higher elevations and dense, more rugged habitat than the more abundant eastern cottontail. The Appalachian is distinguished by having shorter ears than an eastern cottontail and a dark patch between them.*

APPALACHIAN COTTONTAIL
(Sylvilagus obscurus)

Only about 10 years ago, this little southern highlands rabbit had a distinctly northern name: New England cottontail. That species (*Sylvilagus transitionalis*) was thought to range from the Atlantic coast forests of southern Maine to southern New Jersey and eastern New York, then south through the Appalachians from central Pennsylvania to northern Alabama.

But in 1992, after examining hundreds of specimens, scientists found sufficiently significant differences in chromosome numbers and cranial measurements between New England and Appalachian populations to declare them separate species. The Appalachian cottontail was "born."

In North Carolina the rabbits live in scattered pockets above 2,500 feet. Some folks call them "woods rabbits," and rightly so. They favor mixed mountain forests and dense thickets of laurel, rhododendron and blueberry. They can also be found in small, isolated clearings with stubby growth 5 to 10 years old. Their tiny communities are fenced off, by elevation and the woodlands they favor, from surrounding lower valleys



and the more common and numerous eastern cottontail rabbit.

Biologists say that unless you have skull specimens in hand to look for minor differences, you can't reliably distinguish an Appalachian cottontail from an eastern. Still, there are clues. Eastern cottontails often have a small white blaze on their foreheads; Appalachians never do but frequently have a blackish patch between their ears. An Appalachian's ears are shorter than an eastern cottontail's and sometimes rimmed with black. The fur on the mountain rabbit's cheeks is often distinctly grizzled gray, too.

A more important difference between

Only in the Mountains

written by Terry Krautwurst

North Carolina's high country is home to wildlife you won't find anywhere else in the state. Here's a look at some of the mountains' unique animals.

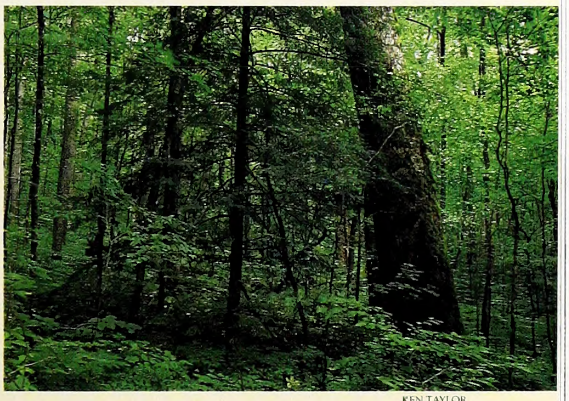
KEN TAYLOR

the species, though, may be the Appalachian cottontail's suspected greater tolerance for harsh high-elevation winters. This could help the rabbit resist competition for territory by the eastern cottontail, which is expanding its range upward as mountain woodland and ivy thickets are cleared or otherwise lost.

Hunters, too, may help the rabbits. Both Appalachian and eastern cottontails are prolific breeders, with does producing as many as six litters a year of three to eight babies each. The young are born blind and furless, but within a month they're on their own. The mother by then may be near to bearing another litter.

North Carolina hunting regulations don't discriminate between the species; all cottontails are fair game in season. But the Appalachian's steep, brushy, hard-to-navigate habitat protects it from intense hunting pressure. The result is a far greater take of eastern cottontails on adjacent cleared land and in valleys, and therefore less competition for food and space.

If you notice a little rabbit munching grass by the roadside on a drive through the mountains, look again. If the location is above 2,500 feet and deeply surrounded by woodland or highland brake, you may well have spotted a Tar Heel "woods rabbit."



KEN TAYLOR

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CAROLINA NORTHERN FLYING SQUIRREL (*Glaucomys sabrinus coloratus*)

Those ripcord-yanking base jumpers who leap off tall buildings have nothing on this small, secretive aeronaut of our state's sky-scraping forests.

More glider than flier, the squirrel flings itself from a branch, plummets earthward long enough to gather speed, then spreads all four legs to open its four-cornered "chute." Its flat tail acts as a rudder, usually steering the rodent toward a tree trunk. To brake, it raises its forepaws—like a can-can dancer lifting her skirt—and lands with grasping claws.

The small, grayish, whiter-bellied southern flying squirrel is more common, living at lower mountain elevations and throughout the state. Biologists first discovered the Carolina northern flying squirrel, which has a brownish or reddish coat, in our mountains in 1953. Widely distributed across northern states and Canada, the northern flying squirrel exists here only in isolated pockets above 4,500 feet, where northern hardwood forest gives way to spruce and fir. Just nine populations of the Carolina subspecies are known—eight in North Carolina, from Graham to Ashe counties, and one in southwestern Virginia.

Unlike its nut-eating southern cousin, the Carolina northern flying squirrel favors lichens and fungi, particularly truffles, which grow underground. The squirrel feeds from dusk to dawn, gliding but more often jumping from tree to tree.

For shelter it will use a leaf or twig nest, although it prefers the safer confines of a cavity such as an abandoned woodpecker hole. The squirrel lines its nest with finely shredded bark, usually yellow birch.

Its tastes for high-elevation foods and nesting materials may partially explain why the Carolina northern flying squirrel doesn't occupy lower territory. Competition with the southern flying squirrel is surely a factor, too. Scientists are concerned over the shrinkage of the mountain squirrel's habitat, due largely to the die-off of upper-elevation conifers from pollution and infestation by the woolly adelgid, an exotic insect. The Carolina northern flying squirrel was declared a federally endangered subspecies in 1985.

Because of its extreme rarity and nocturnal habits, your chances of spotting one are slim. On the trail, however, you may well notice one of the nearly 1,000 nest boxes placed by biologists in the Smokies, on Grandfather and Roan mountains, and in various sites in the Balsam, Plott-Balsam, Black and Craggy mountains to help locate and monitor populations. Never disturb a nest box. Each can provide important clues as to the best ways to manage and protect these remarkable creatures.

R. W. VAN DEVENDER

KING MONTGOMERY

BROOK TROUT (*Salvelinus fontinalis*)

In the late 1980s, researchers discovered a genetic "fingerprint" that proved what mountain anglers had been saying all along: The feisty little brook trout that dart about in the upper reaches of southern Appalachian streams are a different sort of fish than the more sluggish ones downstream.

The scientists point to gene frequencies and enzyme analyses to make the distinction. Anglers just point to the fish itself. The ones taken from higher, more remote streams have bigger eyes, brighter colors and more of the red spots that give the "speckled" trout its nickname. "Specks" are also said to taste better than their lackluster cousins.

Some biologists remain unconvinced, saying the fish are too variable to differentiate by appearance. They suggest that habitat conditions may explain why some populations seem more vigorous than others.

In that case, the southern Appalachian brook trout may indeed hold the upper hand to its cousin with a northern heritage. The native brook trout survives only in pristine mountain streams, usually in headwaters so high and remote that not even the hell-bent-for-lumber logging industry of a century ago could reach them. Fish in lower creeks—streams long shaded by dense forest that cooled the waters and held back erosion—were less fortunate.

Brook trout are aggressive feeders, a trait that unfortunately led to overfishing back in the days when they were so abundant that settlers carried them home by the washtub. Much of the state's indigenous trout population was wiped out.

In an attempt to restore fisheries, rainbow trout from the West and brown trout from Europe were introduced to mountain waters, which the imports soon dominated. Brook trout raised in northern hatcheries also were added. They quickly crossbred with remain-

KEN TAYLOR

ing natives. Only those brook trout upstream of natural barriers retained their genetic purity.

Actually, brook trout aren't trout at all but char, a group of salmonids of northern origin. Like rainbows and browns—"true" trout—they require cold water below 68 degrees Fahrenheit and are therefore limited to the mountains.

Brookies become especially beautiful in fall, when they spawn. The male seems to mirror the foliage above, his belly turning vivid orange.

You can catch non-native trout—rainbow, brown and "ordinary" brook—in most designated waters. You'll have to look harder for the natives. Most are on steep terrain in small, high feeder creeks of headwater tributaries to the Nolichucky, Nantahala, Pigeon, French Broad, Tuckasegee and other river basins. Expect to spend most of your time crawling under rhododendron and wading chest-deep in doghobble to get from one tiny pool to the next.

HELLBENDER (*Cryptobranchus alleganiensis*)

Many a mountain angler has been startled upon landing a "trout," only to discover a squirming, tail-whipping refugee from the Lost World.

"Surely one of the world's ugliest" creatures, declared a 1940s naturalist upon viewing not just a hellbender, but a record 29½-incher pulled from the Little Pigeon River by a boy fishing. The average hellbender is smaller—16 to 20 inches full-grown. In Asia, home of the only two other giant salamander species in the world, the hellbender's lookalike cousins can grow up to 5 feet.

That the hellbender resembles an enormous flattened tadpole with a bad case of bathtub wrinkles is no accident. All salamanders begin life as aquatic larvae. Most eventually metamorphose into at least semi-terrestrial creatures. The hellbender changes only partially, losing its external gills but never quite outgrowing its youthful larval physique, and never leaving its watery environment.

Though it has lungs and gill slits and sometimes comes to the surface to gulp air, the hellbender breathes mostly through its skin. The deep folds and wrinkles increase surface area, and thus the amphibian's ability to take in suspended oxygen.

Their need for cool, fast, highly oxygenated water partially explains why hellbenders are found in many of the same western North Carolina rivers and streams as trout. Like trout, hellbenders require large river rocks for shelter and a sand or gravel bed in which to make nests. But unlike trout, which can survive in tiny high-elevation feeder creeks, hellbenders need large waters below 3,000 feet—rivers and sizeable streams that never dry out and provide plenty of crayfish, their primary food.

Hellbenders hide beneath rocks during the day and come out at night to forage, seldom traveling far.

Hellbenders were once plentiful in streams throughout their range, from New York and Pennsylvania to northern Georgia and west to Kentucky. Pollution and siltation have taken their toll, however, and populations are declining or have disappeared in many areas.

In North Carolina they're designated a

JACK DERMID

***Large, cool mountain** streams with sheltering rocks provide habitat for the hellbender (above), while native brook trout (near left) are found in higher-elevation feeder creeks. The Carolina northern flying squirrel (far left) requires food and nests that only highland forests provide in this part of the country.*

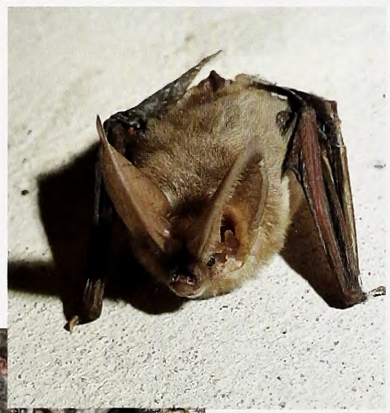
KEN TAYLOR

species of special concern but have benefited from stream management in our national forests and watersheds. Populations are healthy in many waters, including the South Toe, Davidson, Mills and Watauga rivers.

If you catch a hellbender while fishing, release it just as you would a trout. Keeping the amphibian in water as much as possible, grab the hook's shank with needle-nose pliers and let the hellbender's own weight pull it from the hook. Be careful and patient; hellbenders can inflict a minor bite, but seldom do.

R. W. VAN DEVENDER

R. W. VAN DEVENDER



VIRGINIA BIG-EARED BAT
(Corynorhinus townsendii virginianus)

Its face resembles that of a title character from the movie *Gremlins*, with long, pointed ears and an upturned snout topped by two odd, bulbous lumps. Hardly a maker of mischief, though, the docile Virginia big-eared bat is one of North Carolina's shyest and rarest mammals. It also is one of our largest bats, with a wingspan of 11 to 12 inches.

Aptly named, it possesses huge sound catchers. Its ears are an inch and a quarter long and, when laid back, span half its body. Their main function is to direct sound to the inner ear for echolocation, but some experts believe they may also provide extra lift because they're frequently turned forward when the bat is flying. Only one other species in the state, the more common Rafinesque's big-eared bat, which has a lighter underbelly, has such distinctly large ears.

Biologists first discovered Virginia big-eared bats in North Carolina in 1981, when 34 individuals were found hibernating in a cave on Grandfather Mountain. Like many other bats, Virginia big-eareds gather in colonies during late summer, mate in fall and hibernate together through the winter.

A bat may lose half its body weight while hibernating. When warmer weather returns, the bats forage nightly, gobbling moths to regain strength. Then the colony disperses for the season.

Each male goes its own way, but females head collectively to a maternity site, usually a warmer cave, to bear and raise young. In June each female gives birth to a single hairless pup, its big ears flopped over its face until its eyes open days later. The pups grow fast and can fly at three weeks but continue nursing for about two months.

Radiotelemetry studies of the Grandfather Mountain bats show that the creatures use a variety of habitats for foraging. Some remain mostly in the woods, while others travel down the mountain toward Linville to hunt moths around the golf courses and other open places. Despite extensive efforts to locate it, however, the bats' maternity site remains unknown.

What is known is that identifying and protecting the bats' foraging, hibernation and maternity areas are crucial. The species is much more sensitive to human disturbance than other bat species and will abandon sites altogether if bothered too often.

The Grandfather Mountain population

***The Virginia big-eared** bat roosts in only a few known colonies in the North Carolina mountains and in three nearby states. The southern black-capped chickadee, although rare, can be found in select pockets of spruce and Fraser fir, such as on Clingman's Dome (right).*

JACK DERMID

has steadily increased since 1986, when officials erected an entrance barrier across the hibernation cave, keeping humans out but allowing bats to enter. At last count, there were 273 individuals in the colony. About 10 more hibernate in an abandoned mine in Avery County. Together, they constitute the entire known North Carolina population of Virginia big-eared bats. Larger populations of the federally endangered subspecies live in West Virginia, Virginia and Kentucky. Perhaps 10,000 exist altogether.

BLACK-CAPPED CHICKADEE
(Poecile atricapillus practicus)

Few birds are more common across the northern half of the United States than the black-capped chickadee (*Poecile atricapillus*). In the Midwest and South, the similar but somewhat smaller Carolina chickadee (*Poecile carolinensis*) takes over where the black-capped's range leaves off. Indeed, in our state the Carolina chickadee reigns supreme from the western mountains to the eastern shore.

But here and there in the spruce and fir forests of some of our highest peaks live black-capped chickadees unique to the southern Appalachians, a subspecies dubbed *practicus*. Unlike its relatives in the North, the black-capped chickadee in North Carolina is exceedingly rare.

A year-round resident, the black-capped is suited to mountain climates. The fidgety puff of mostly feathers and bone weighs about half an ounce, roughly the same as a charcoal briquette.

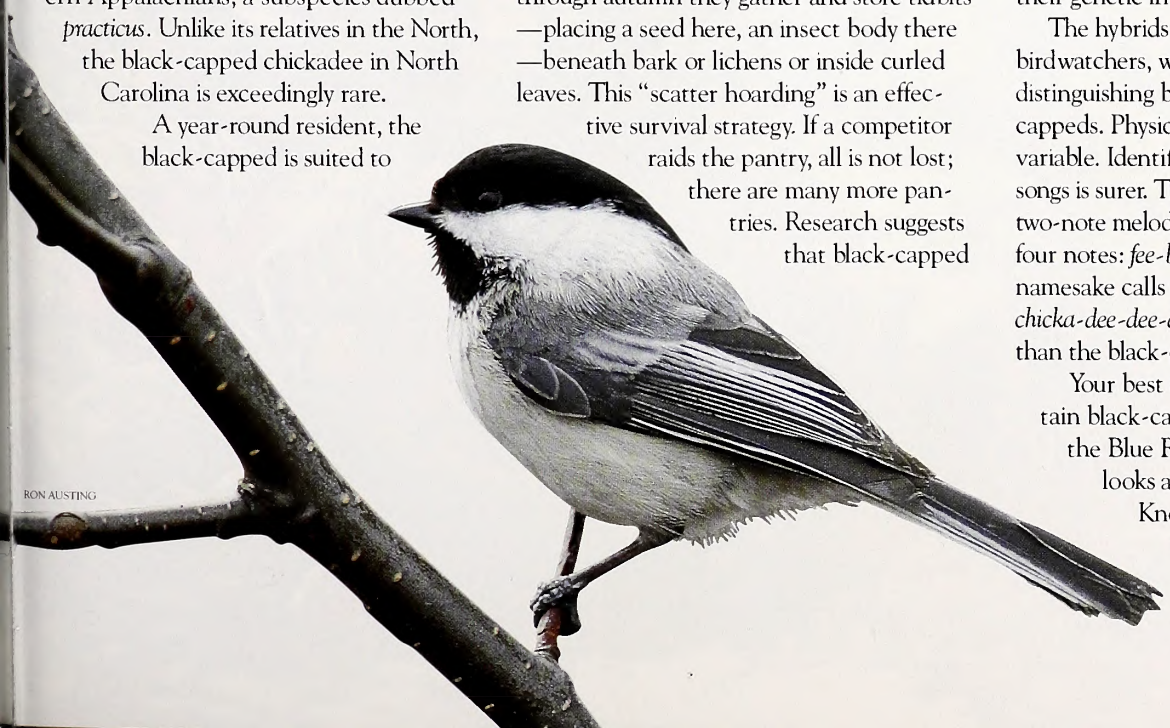
Hot charcoal, though, would soon burn out in frigid weather. Not so with the chickadee, which adds roughly 25 percent more downy plumage in the fall and fluffs up those feathers on cold winter days to create a full inch of insulation, maintaining a body temperature of about 108 degrees. On frigid nights, when the tiny dynamo can't continue retrieving food to stoke its fires, the bird reduces its body temperature by as much as 20 degrees as its sleeps, in effect turning down its thermostat to save fuel.

Still, chickadees need a lot of food to stay warm in winter. So from late summer through autumn they gather and store tidbits —placing a seed here, an insect body there —beneath bark or lichens or inside curled leaves. This "scatter hoarding" is an effective survival strategy. If a competitor raids the pantry, all is not lost; there are many more pantries. Research suggests that black-capped chickadees can remember the precise locations of stashed food, sometimes numbering in the thousands, and may even refresh brain cells in the fall to boost their recall power.

As plucky a survivor as the black-capped chickadee is, its fate in North Carolina is shaky. As recently as the mid-1800s, these birds ranged throughout our mountains at elevations as low as 2,000 feet. Today they're seldom found below 4,500 feet and have disappeared entirely from many areas, including Mount Mitchell and the Black Mountains. And in some overlap zones where preferred plant communities have been lost, Carolina and black-capped chickadees must share habitat and are hybridizing, weakening their genetic integrity.

The hybrids also create confusion for birdwatchers, who have a hard enough time distinguishing between Carolinas and black-cappeds. Physical differences are subtle and variable. Identification based on the birds' songs is surer. The black-capped sings a lilting two-note melody: *fee-bee*. The Carolina sings four notes: *fee-bee-bee-bay*. The chickadees' namesake calls differ, too. The Carolina's *chicka-dee-dee-dee-dee* is higher and faster than the black-capped's *chicka-dee-dee-dee*.

Your best chances for seeing mountain black-capped chickadees are along the Blue Ridge Parkway from the overlooks at Richland Balsam, Waterrock Knob and Heintooga, and on the road to Clingman's Dome in the Great Smoky Mountains National Park. ⊠

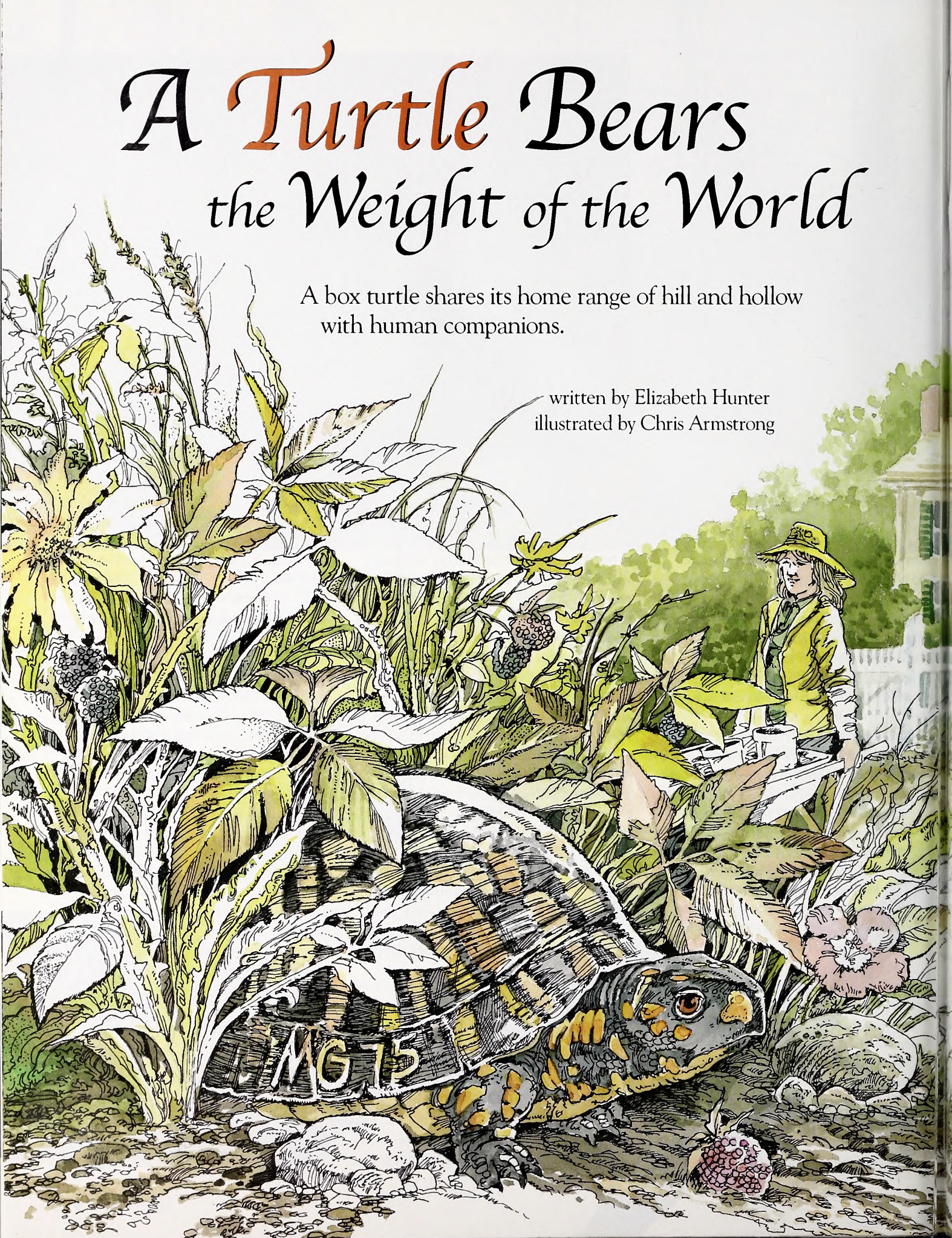


RON AUSTING

A Turtle Bears the Weight of the World

A box turtle shares its home range of hill and hollow with human companions.

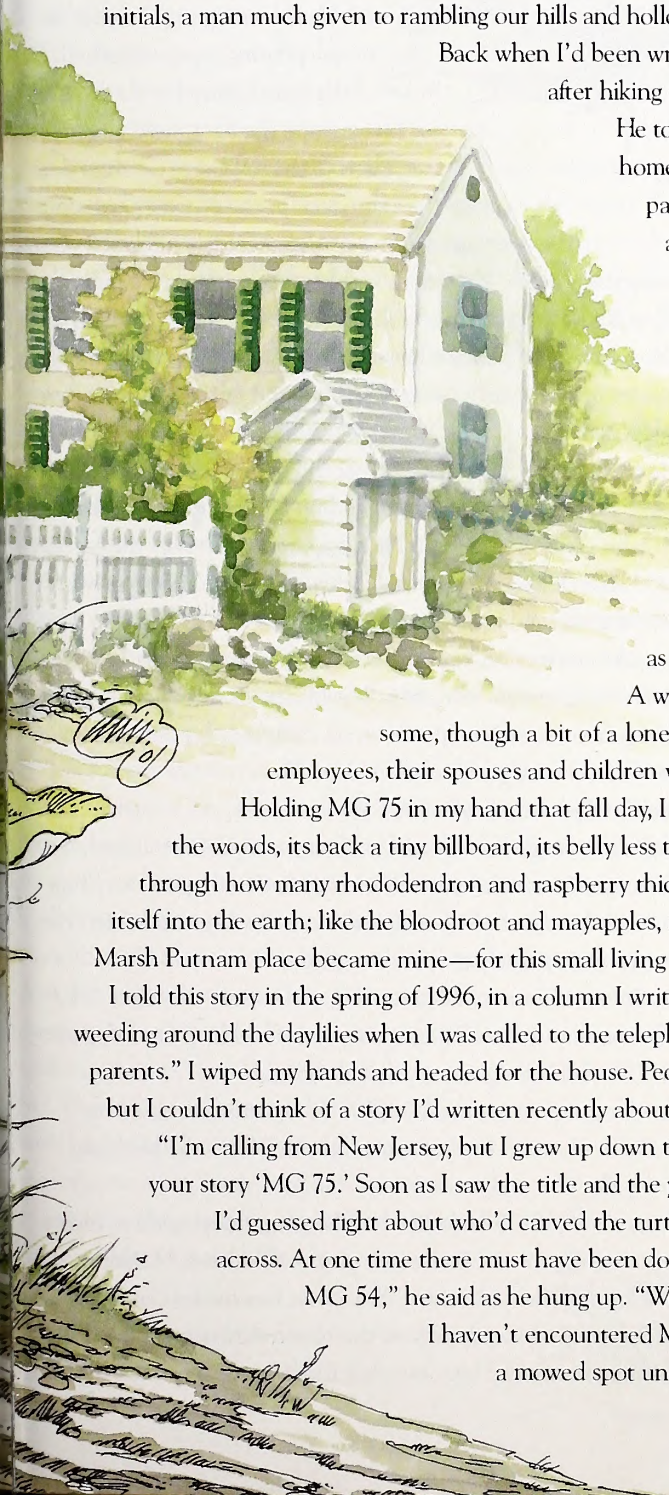
written by Elizabeth Hunter
illustrated by Chris Armstrong



Returning from the mailbox one fall afternoon in 1995, I noticed my dog, Lucy, nosing something in the grass. Her forte is flushing juncos, digging up moles and announcing the arrival of the meter reader, so I almost didn't go to look at what she'd found. Sure enough, all that bother and fuss was over not much of anything: an eastern box turtle, its hinged lower shell clamped tightly shut.

But I'm partial to turtles. Almost automatically, I picked this one up. Its carapace was scarred, suggesting great age, which may be the reason I examined it closely. To my astonishment, my attention was rewarded. A message—"MG 75"—had been carved on the side of the turtle's shell. The carver had wielded his knife with care, so as not to cut through the dark, yellow-splotched horn. For an instant I felt disoriented, the way you do waking from a vivid dream. What could the message mean?

Then I knew. The letters were initials, the 75 an abbreviation for 1975. MG? I cast about, then remembered an old neighbor with those initials, a man much given to rambling our hills and hollows before his mind and vision went and he was confined to a nursing home.



Back when I'd been wresting my place from the wilderness, he sometimes materialized in my yard after hiking up the ridge from the river.

He told me I'd bought "the Marsh Putnam place," named for his grandfather, whose home it had been when MG was a boy. He'd spent some time living with his grandparents, a time, it was clear, that he remembered fondly. MG never said much, and he always turned down my invitation to see what I'd done to the inside of the house. But his eyes lingered over the changes I was making in the yard, and I felt sure he was happy to see me gardening where his grandmother had, to know the old place was once again lived in and loved.

I saw him for the last time seven or eight years ago, walking down the road. He stepped gingerly, taking tiny steps the way a woman would whose feet had been bound. A long-handled brush was tucked under his arm like a crutch.

I scared him when I stepped up to say hello, which let me know he could only see me dimly. When I explained—again and again—who I was, he tried hard to remember. Clean-shaven in the past, he had a beard, cottony as clouds, that day. He looked like Father Time.

A woman who'd known MG as a young man told me he'd been dashingly handsome, though a bit of a loner, and shy. Her husband worked with him at the feldspar plant, where the employees, their spouses and children were like a big family. At parties they held, MG danced the Highland fling.

Holding MG 75 in my hand that fall day, I felt I was holding a miracle. Since MG had initialed that turtle, it had roamed the woods, its back a tiny billboard, its belly less than an inch off the ground. It had clawed its way over how many fallen logs, through how many rhododendron and raspberry thickets? Perhaps it had crossed and recrossed the road. Each winter it had dug itself into the earth; like the bloodroot and mayapples, it had emerged each spring. It had taken 20 years—since the year before the Marsh Putnam place became mine—for this small living thing to crawl from MG's hand to my own.

I told this story in the spring of 1996, in a column I write for *Blue Ridge Country* magazine. A couple of months after it appeared, I was weeding around the daylilies when I was called to the telephone. "There's a man wants to talk to you—says you wrote a story about his parents." I wiped my hands and headed for the house. People occasionally telephone me about features I write for the local newspaper, but I couldn't think of a story I'd written recently about anyone's parents.

"I'm calling from New Jersey, but I grew up down the road from where you live," my caller said. "Somebody sent me a copy of your story 'MG 75.' Soon as I saw the title and the picture of the turtle, I knew what it was about."

I'd guessed right about who'd carved the turtle's back. For years, his father had initialed and dated every turtle he came across. At one time there must have been dozens of marked turtles in the woods around my place. "Keep your eye out for MG 54," he said as he hung up. "We saw that one 10 years running."

I haven't encountered MG 54, but about a week after the phone call, I noticed a turtle eyeing me from a mowed spot under the mulberry tree as I hauled weeds to the compost pile. When I picked him

up, there was the familiar inscription: MG 75.

A turtle's not exactly huggable, but that's what I felt like doing.

MG 75 stuck around for a couple of weeks that time. He seemed to enjoy watching me work in the garden. Every couple of days, about the time the sun peeped over the pines, I'd notice him crawling up toward the garden from wherever he'd spent the night.

"Beautiful morning, isn't it?" I said, kneeling beside him with a handful of slugs picked from the daylilies. He ate with gusto, lunging at my offerings open-mouthed. By the time I retired to the house to escape the heat, he'd already retreated to the raspberry patch to doze away the afternoon. In the evenings, we sometimes met again at the border of garden and lawn, where fat mulberries dropped from overarching limbs. His mouth was smeared with purple pulp.

"In the evenings, we sometimes met again at the border of garden and lawn, where fat mulberries dropped from overarching limbs. His mouth was smeared with purple pulp."

Just as I'd grown accustomed to MG 75's companionable presence, June faded into July and I realized I hadn't seen him in days. I thought perhaps he was aestivating—a kind of summertime hibernation box turtles indulge in when the weather turns hot and dry. I looked for him again that fall, but he didn't reappear.

On June 15, 1997, one year to the day after he'd made his second appearance to me, MG 75 was back at the edge of my garden. I'd been on the lookout for him for a couple of weeks, ever since I'd started noticing box turtles crossing the road. He'd apparently been in the garden feasting on slugs and was poised to slide down into the raspberries for his siesta. But he wasn't moving when I noticed him, watching me, about 10 feet from the spot I'd first seen him the year before. Though the rational part of my mind knew he was doing no such thing, I felt he was willing me to look his way. We were several feet apart, but I knew immediately it was MG 75. A chip of horn was missing from one of the plates on his carapace, exposing a small triangle of cement-colored bone. I could see that from where I stood.

MG 75 appeared at the garden's edge every day or two for a few weeks, just as he had the year before. Occasionally I brought him inside for a bite of hamburger, which he relished, but he wasn't much interested in sticking around the house. When I picked him up to carry him back down to the garden, he stuck his head out of his shell as far as it would go and oared the air energetically, as though to return more quickly to his home ground.

Around July 10, I realized I hadn't seen him in about a week, and I spent the fall of 1997 working 700 miles from home. By the time I returned, the box turtles had long since dug into the ground for the winter. Maybe I'll find him again next year, I thought.

A turtle expert I talked to not long after I first made MG 75's acquaintance asked me whether he was male or female. "Males have red eyes; females brown. That's the best diagnostic for sexing the eastern box turtle," he said.

"I'm sure his eyes were red once, but MG 75 looks like he's been up studying three nights straight, or spent a rough night out on the town. His eyes are pink—bloodshot," I said.

"He could be as much as 80 years old, then," he said. "You know, box turtles can live to be more than 100. They're the longest-lived vertebrates on the North American continent.

"Another thing," he added. "You just noticed him, but that turtle's probably been watching

you for years. Box turtles have small home ranges. You probably live right in the middle of his."

Working in the garden, I thought about that—my home on his range. If MG 75 had seen fourscore years and more, he was born not long after the railroad that whistles through my valley opened these mountains to the world, decades before the REA brought electric lights to scattered mountain cabins like mine. Though I doubt my neighbor suspected it when he carved MG 75's back, he and the turtle were probably about the same age. Each spent a long lifetime wandering my woods. The paths they followed crisscross these ridges and hollows like an unseen, tangled net.

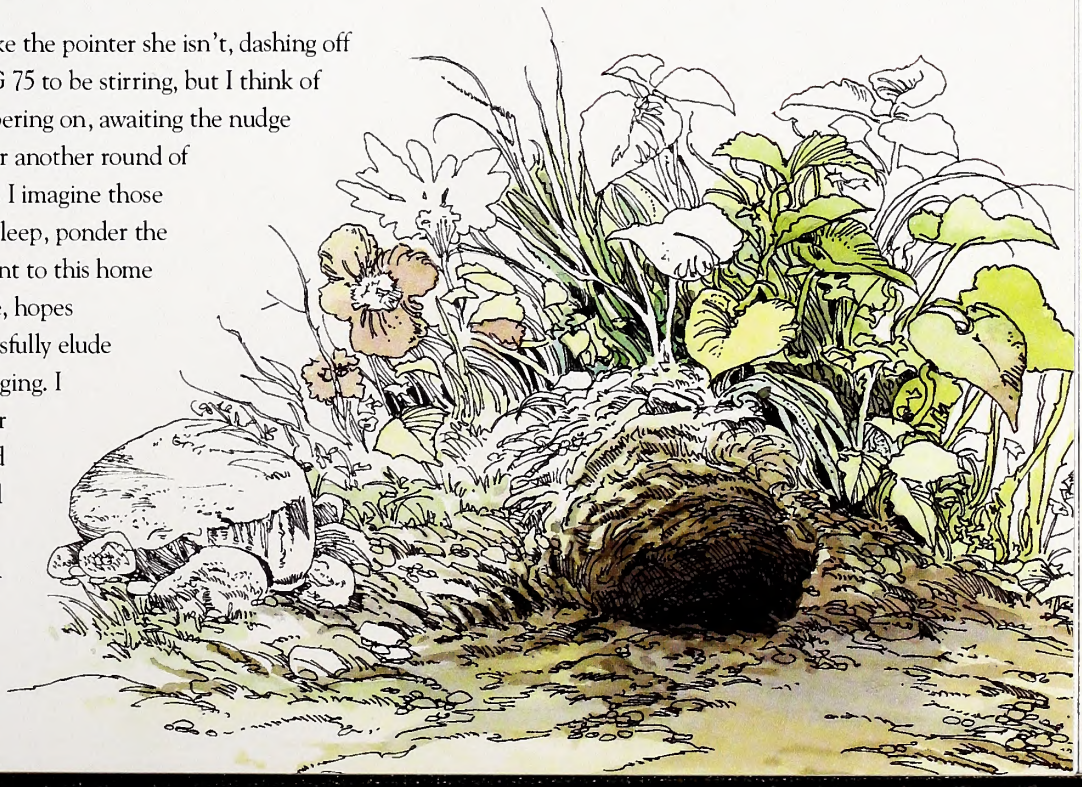
During an early January thaw this year, I spent four sunny afternoons clearing old canes and debris from the raspberry patch. While I worked, I had the strongest feeling that MG 75 was close by—underground, perhaps even underfoot. I thought too of my old neighbor, who had walked my ridge for the last time. I'll glean no more from him of those who held this place dear long before I came here. He died the year before last; his place down the road is up for sale. Which may help explain why I search the border between garden and woods so diligently for his proxy's familiar splotched shell, and why I've felt the same rocketing joy when he's shown up, every year but one. A whole world rides for me now on the back of that small turtle.

Of course, there's nothing new about that. Many indigenous peoples on the North American continent believed Great Turtle bore the weight of the world. Though details of the creation myth vary, one version of the story is that Skywoman fell out of the heavens and landed on the back of Great Turtle, who swam ceaselessly across the watery waste. Many creatures dived to the bottom of the ocean to try to bring up mud, from which to fashion a world for Skywoman. At last Muskrat succeeded, and the creatures coated the back of Great Turtle with a layer of soil. As Skywoman slept, the soil itself grew; streams appeared, and many plants—trees, grasses and shrubs—sprang up. Skywoman awoke to find herself the sole inhabitant of this new world, though she soon gave birth to a daughter, First Woman. When the girl was grown to womanhood, Skywoman returned to the heavens to become Grandmother Moon, who still floats above Great Turtle as he swims the limitless seas.

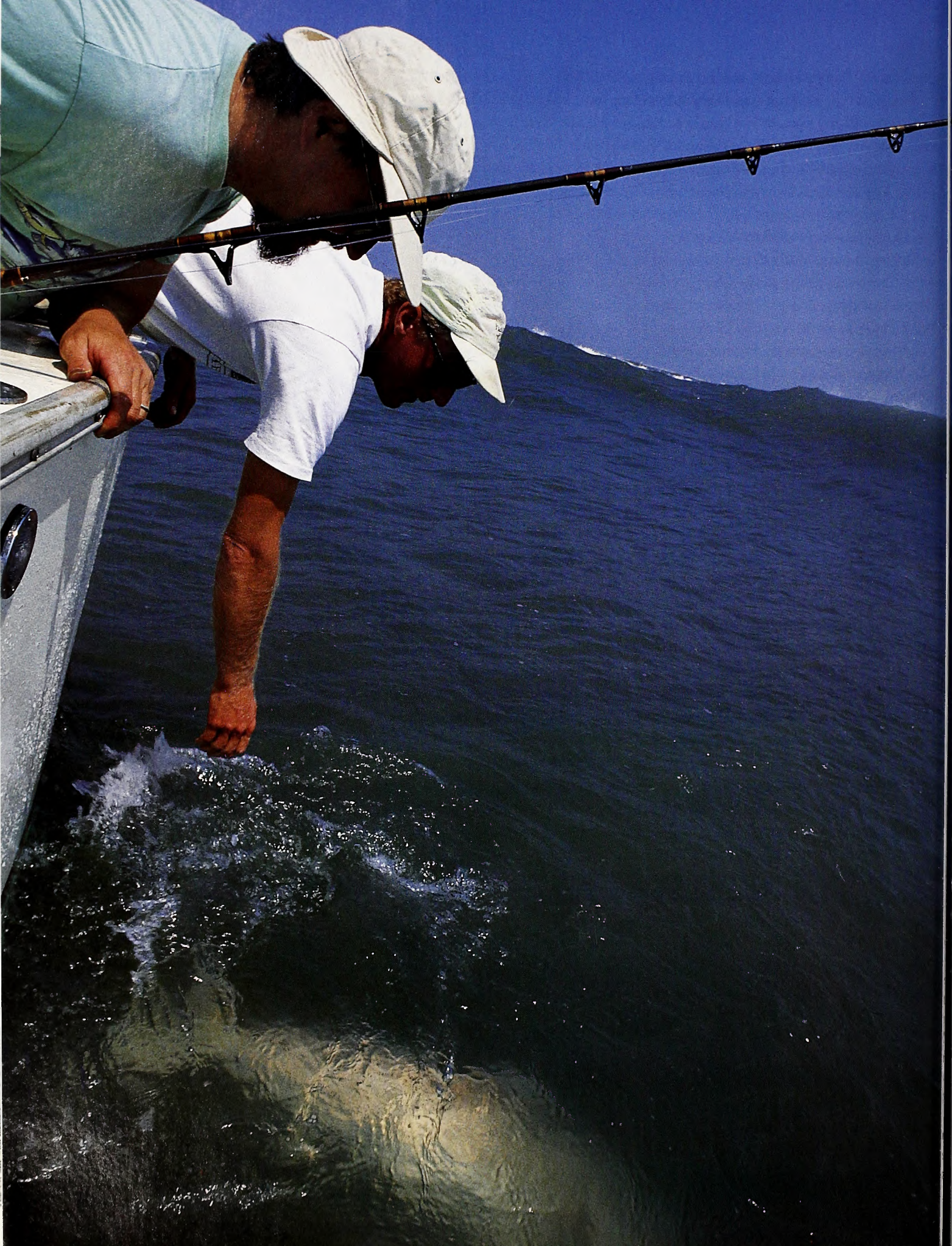
It matters little that the planet floats in a vacuum instead of an ocean. When winter gives way to spring's unlocking, I feel like Skywoman, astonished by the new life rising all around me from soil lying deep and fertile on the carapace of an old turtle-world. I spend hours in the garden, planting onions, spinach and peas, then walk the woods in search of hepatica, trailing arbutus and trout lily.

Lucy accompanies me, lifting her forefoot like the pointer she isn't, dashing off after a squirrel. I know it's too early yet for MG 75 to be stirring, but I think of him buried somewhere in the cold earth, slumbering on, awaiting the nudge that will set him swimming, like Muskrat, up for another round of mulberries, slugs and siestas in raspberry shade. I imagine those bloodshot old eyes opening after another long sleep, ponder the dear dim reptile brain that shares my attachment to this home range of hill and hollow. Lucy dashes to my side, hopes undiminished by the zillionth squirrel to successfully elude her. The pat I give her sends her tail madly wagging. I wish I could tell her how grateful I am to her for showing me a box turtle worthy of notice—and thank MG 75 for helping me find my way to all these wonderful stories. ⊠

"I know it's too early yet for MG 75 to be stirring, but I think of him buried somewhere in the cold earth, slumbering on, awaiting the nudge that will set him swimming . . . up for another round of mulberries, slugs and siestas in raspberry shade."



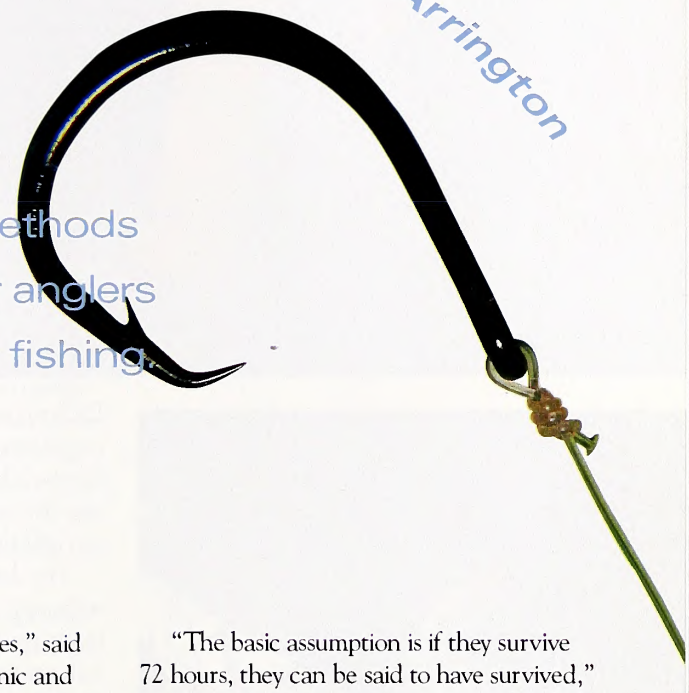
Elizabeth Hunter is a freelance writer who lives in Bakersville.



Coming Full Circle

written and photographed by Joel Arrington

New tackle and innovative methods are prompting more saltwater anglers to practice catch-and-release fishing.



Spawned in ponds, reservoirs and lakes throughout the country, the practice of catch-and-release fishing has gained wide acceptance among freshwater anglers. The same cannot be said, however, of those who enjoy wetting lines along our coast. Probably due to the delectability of certain marine species, an angler that has unhooked a saltwater fish is more inclined to head to the cooler than the side of the boat. The same person that will release every largemouth bass he catches during a season wouldn't dream of freeing even one legal striped bass.

It's unfortunate because the stocks of North Carolina's marine species are incurring pressures from all sides. Declining water quality, compromised habitat and commercial overfishing have all taken their toll on saltwater fish populations. Added to that are the sheer numbers of recreational anglers who trek to the coast each season. Managers estimate there are currently 600,000 resident North Carolina anglers, with at least that many more visiting from other states. Even with such an inefficient harvest tool as a hook and line, the damage can mount up.

"Although the recreational harvest is only about 6 percent of the total U.S. harvest, it is important to managers because the fishing activities of millions of marine anglers are directed at a relatively few species," said Mark Holliday, the National Oceanic and Atmospheric Administration's division chief for statistics and economics.

But there are signs of gradual improvement regarding release rates among saltwater species. From 1989 to 1999, fish released by recreational anglers increased from 45 to 59 percent, according to NOAA, which manages saltwater fisheries through the National Marine Fisheries Service.

With saltwater anglers now returning some of their catches, the question is how to better the odds that those fish will survive. George Beckwith, a North Carolina fishing guide with a degree in marine biology, and Rob Aguilar, a graduate student in fisheries at N.C. State University, have designed a study to measure the survival of red drum in eastern Pamlico Sound. They catch and tag the fish with devices that emit radio signals. By listening with acoustic instruments, they can determine if the drum have survived hours or days after their release.

"The basic assumption is if they survive 72 hours, they can be said to have survived," said Beckwith, attempting to locate fish from his boat in the mouth of the Neuse River.

Sitting on a gunwale, Aguilar wears earphones, which are connected to a listening device submerged in the water beside the boat. He said they often have been able to find drum days after they've been tagged.

New attitudes and *innovative tackle, such as circle hooks (below), are leading to the release of more saltwater fish, even large specimens such as a big red drum released at Ocracoke Inlet (facing page).*

Fisheries researcher *Rob Aguilar listens for the underwater pings emitted by tags placed on red drum in the Pamlico Sound. The pings let researchers know if released fish survive after being caught. Some species, such as striped bass (top) and false albacore (facing page), are more likely to survive if pushed or dropped headfirst into the water to provide better oxygen flow across their gills.*

Each tag sends a distinct signal so that when one of the researchers hears it, he knows which fish he is listening to. "That's 79," he might say. "It's a 30-pounder we tagged four days ago off Point of Marsh."

The data they have gathered so far, Beckwith said, indicate that the right-size circle hook, used in the correct manner, greatly reduces deep hooking. He pulled out a circle hook that appeared too large for any red drum. Anglers might use an 8/0 conventional hook up to possibly a 12/0 for the largest drum, depending on the hook's manufacturer and model. "This 16/0 circle hook is one long-liners use for big tuna," he explained, "but it consistently catches drum as small as 18 inches."

A relative newcomer to the tackle scene, the circle hook is being viewed as one of the best catch-and-release innovations to come along in a while. At first glance, the twisted steel of a circle hook appears unlikely to hook anything. Its point proceeds around as if it were trying to hook itself. In fact, a circle hook is unlikely to hook anything deep inside a fish. But when it is pulled from the mouth at an angle, the point will hook the jaw almost every time. Studies have shown that fish hooked deep inside are less likely to survive than fish hooked around their mouths. Furthermore, circle hooks are likely to hook from the inside out, essentially eliminating foul hooking.

Beckwith and Aguilar found that a conventional 7/0 hook deep-hooked large red drum as much as 48 percent of the time, whereas a 16/0 circle hook reduced deep hooking to around 11 percent. But the mortality question remains. What percentage of the fish hooked deep with a relatively small hook are dying versus those hooked deep with the larger circle hook? Benefits gained from reducing deep hooking may be offset by higher mortality caused by a larger, heavier hook that may not corrode away as quickly. Beckwith and Aguilar have applied for another grant to better assess mortality rates and to confirm initial results of their radio telemetry work.

But the circular hooks aren't just popular because of release fishing. Anglers have discovered that circle hooks are simply better at catching certain species of fish than the traditional J-hook styles. Billfish tournaments such as the Central America Presidential Challenge in Guatemala are beginning to adopt circle hooks exclusively in their bait fishing. Artmarina, host to a large charter fleet there, now uses circle hooks exclusively in baits. Circle hooks are used on grouper and snapper and, for some time, have been the hook of choice in Florida tarpon-fishing baits. The Outer Banks winter bluefin tuna charter fleet now uses circle hooks almost exclusively, participants say.

Hatteras Island surf anglers in recent years have insisted on circle hooks for striped bass, not because the fish survive release better but because "it's the most efficient hook," said Bob Eakes, the owner of a tackle shop at Buxton. Eakes and other anglers use light-wire circle hooks with great success on Hatteras Island flounder. "The hook of choice on the Outer Banks is a 39960 ST Mustad 13/0 circle hook. They catch better," he said, "and once a fish is hooked, you almost never lose it."

Eakes first introduced circle hooks to the Outer Banks bluefin tuna fishery. He has tagged hundreds he caught on circle hooks. Following his success on bluefins, Eakes advocated circle hooks to Capt. Ron Hamlin and other skippers on a trip to Guatemala. Hamlin later conducted circle hook seminars at the 1999 Miami Boat Show. Eakes also introduced Brian King to the hooks when King was a mate at Hatteras. King later became a skipper and worked on boats around the world, Eakes said, taking the hooks eventually to New Zealand, where today they are the exclu-

sive hooks used in striped marlin baits.

Anglers have found that they must use a different hook-setting technique with circle hooks. Rather than jerking when the fish takes the bait, the angler must gradually take up slack and begin reeling.

Many anglers and management officials remain optimistic that circle hooks will reduce mortality inherent in catch-and-release across a broad spectrum of freshwater and saltwater fisheries. Studies in Maryland and Massachusetts, for example, indicate that about one in 12 striped bass released after being caught on a conventional hook dies. But the number varies with such factors as water temperature, how long the fish has been played and where in its body it is hooked. It is still too early to know the number of fisheries in which the hooks will prove effective or the extent to which they will limit bycatch mortality, but research is under way around the world.

Studies in New York and Virginia showed no increased survival of flounder caught on circle hooks as opposed to J-hook designs. A North Carolina researcher found similar results.

Even so, circle hooks have proven themselves in tuna and billfish fisheries. Tim Choate, writing in the International Game Fish Association's *1999 World Record Game Fishes*, suggests that circle hooks are the greatest thing to happen to billfish angling in a long time. Records kept by Guatemalan boat crews show higher hook-up rates on sailfish and marlin than on traditional J-hooks. Circle hooks also caught Pacific sailfish more efficiently than traditional hooks, and Choate points to additional benefits as well. Billfish jump more often, and fewer sulk in the depths.

For decades, commercial long-line fishermen have depended on the circle hook's efficiency on unattended sets for swordfish, tuna and sharks. Now anglers have created a demand that has hook manufacturers hustling.

So far, standardization has yet to arrive. No one can say precisely what a circle hook is, and size designations vary from traditional designs among circle hook brands. Some anglers and fisheries managers have been speculating on a time when perhaps circle hooks should be made mandatory in appropriate fisheries. Although the use of circle hooks on artificial lures remains experimental, there seems no doubt of their benefits in certain bait fisheries.

Can circle hooks be required? Parks Rountrey, a member of the Virginia Recreational Fishing Advisory Board, says manufacturers are experimenting with all sorts of variations in gap, turn, point angle, barb, shank length and wire diameter. "With no defined standard," he said, "any regulation requiring circle hooks is moot because the term is not defined and is therefore unenforceable. It would be good if the manufacturers would agree to a standard, and they could label their hooks as circle hooks only if they met the standard."

"With saltwater anglers now returning some of their catches, the question is how to better the odds that those fish will survive."

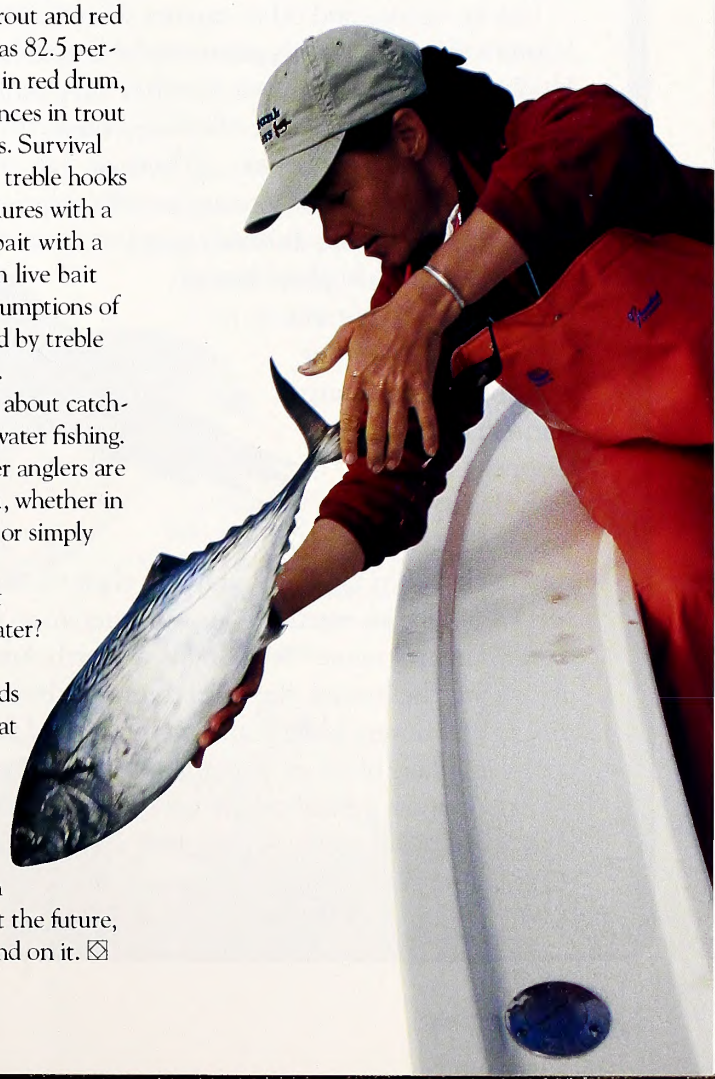
Circle hooks aren't the only method of safely catching and releasing fish, however. For instance, false albacore anglers have learned that these fish fare better when pushed back into the water with a degree of force. The sudden rush of water over the gills seems to rejuvenate the fish.

Also, bottom fish brought up from considerable depth often suffer an inflated air bladder. When released, they are unable to deflate immediately and tend to float. Anglers have discovered that they can deflate the air bladder with a hollow needle, and the fish can return to the bottom with little damage, with the air bladder quickly healing. Research shows a good probability of survival.

Louisiana researchers reported surprising results from a study of speckled trout and red drum releases. Overall survival was 82.5 percent in sea trout and 97.3 percent in red drum, but they found significant differences in trout survival between angling methods. Survival ran 97 percent in trout caught on treble hooks on artificial lures, 91 percent on lures with a single hook, 83 percent on live bait with a treble hook, and 74 percent with live bait and a single hook. So popular assumptions of high post-release mortality caused by treble hooks are not necessarily correct.

Clearly, we have much to learn about catch-and-release when it comes to saltwater fishing. Yet it is encouraging that saltwater anglers are beginning to turn loose more fish, whether in release-only marlin tournaments or simply bottom fishing for croaker.

Will catch-and-release in salt water ever match that of fresh water? Probably not. That is why it is so critical to determine what methods give marine fish the best chance at survival when they are returned. Although recreational fishing is only a small percentage of the overall harvest, it is at least one aspect that individual anglers can control. Indeed, the quality, if not the future, of our marine fisheries may depend on it. ⊠



Eagles and ospreys may get more respect, but ounce-for-ounce, small hawks and falcons are just as powerful. These feathered predators are

kestrel

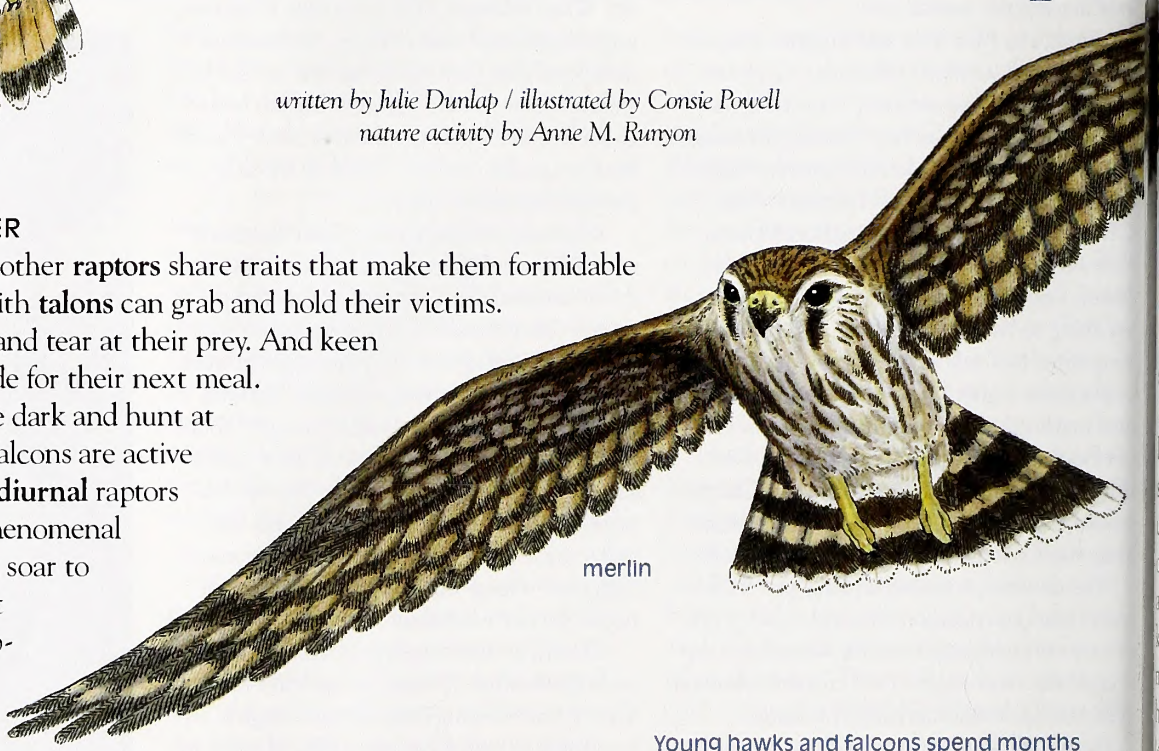
Pint-Sized Birds of Prey

written by Julie Dunlap / illustrated by Consie Powell
nature activity by Anne M. Runyon

PACKED WITH POWER

Hawks, falcons and other **raptors** share traits that make them formidable hunters. Strong legs with **talons** can grab and hold their victims. Hooked bills can bite and tear at their prey. And keen eyes search far and wide for their next meal.

Owls see well in the dark and hunt at night, but hawks and falcons are active during the day. These **diurnal** raptors share another trait: phenomenal flying ability. They can soar to great heights and fly at amazing speeds. Sharp-shinned and Cooper's hawks dash through the woods after small birds, steering between tangled limbs with their rudder-like tails. Merlins—blue jay-sized falcons—accelerate so fast that they earned the nickname "bullet hawk." North America's smallest falcon, the kestrel, flies into the wind, beats its wings rapidly and hovers while scanning the ground for food. The champion fliers of all are peregrine falcons. When a soaring peregrine spots a meal on the wing, it folds its wings and dives for a midair strike. A peregrine's **stoop** often reaches 90 miles per hour.



merlin

Young hawks and falcons spend months perfecting hunting skills. Every chickadee or mouse the young bird misses teaches a hungry lesson in survival.

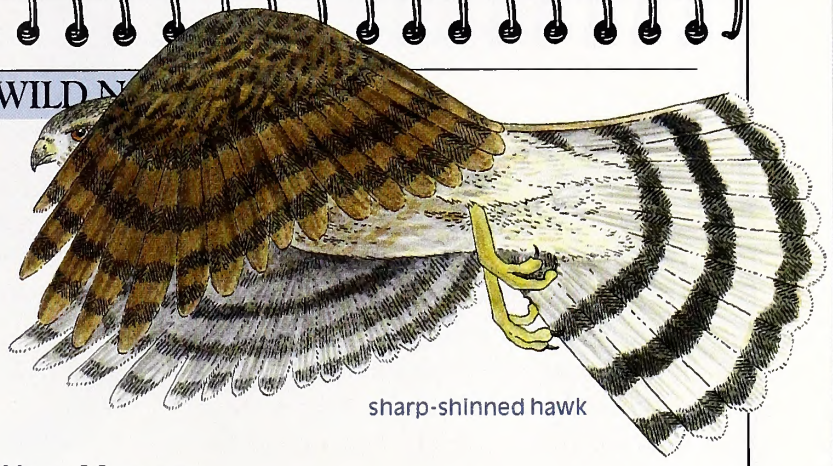
young female kestrel

NATURAL BORN KILLERS?

On summer days in North Carolina, the small raptor you're most likely to see is a kestrel. Like all falcons, kestrels live in open country. You may spot one perched on a farm fence or power line, searching a field for grasshoppers, or flying overhead, shrieking *killy killy killy*. Kestrels are **cavity nesters**, laying their eggs in old flicker holes, crevices in cliffs or barns, or nest boxes built just for them.

North Carolina's most common small hawks, sharp-shinned and Cooper's hawks, are tougher to find. Forest-dwellers all year long, both species are especially secretive during the breeding season. Each mated pair builds a stick nest, lined carefully with bark and other materials, high in a tree. Lucky viewers might glimpse a male swooping silently through the branches, chasing birds to feed the female as she sits on their eggs.

Brooded by the female to stay warm, the helpless hatchlings wait for the male to deliver prey and shred it into bite-sized pieces. The strongest chick, usually the one that hatched first, snatches most of the food. Both parents bring food after about a week, but they still may not catch enough to keep all their chicks alive. And the parents must feed the chicks even after they have grown flight feathers and left the nest.



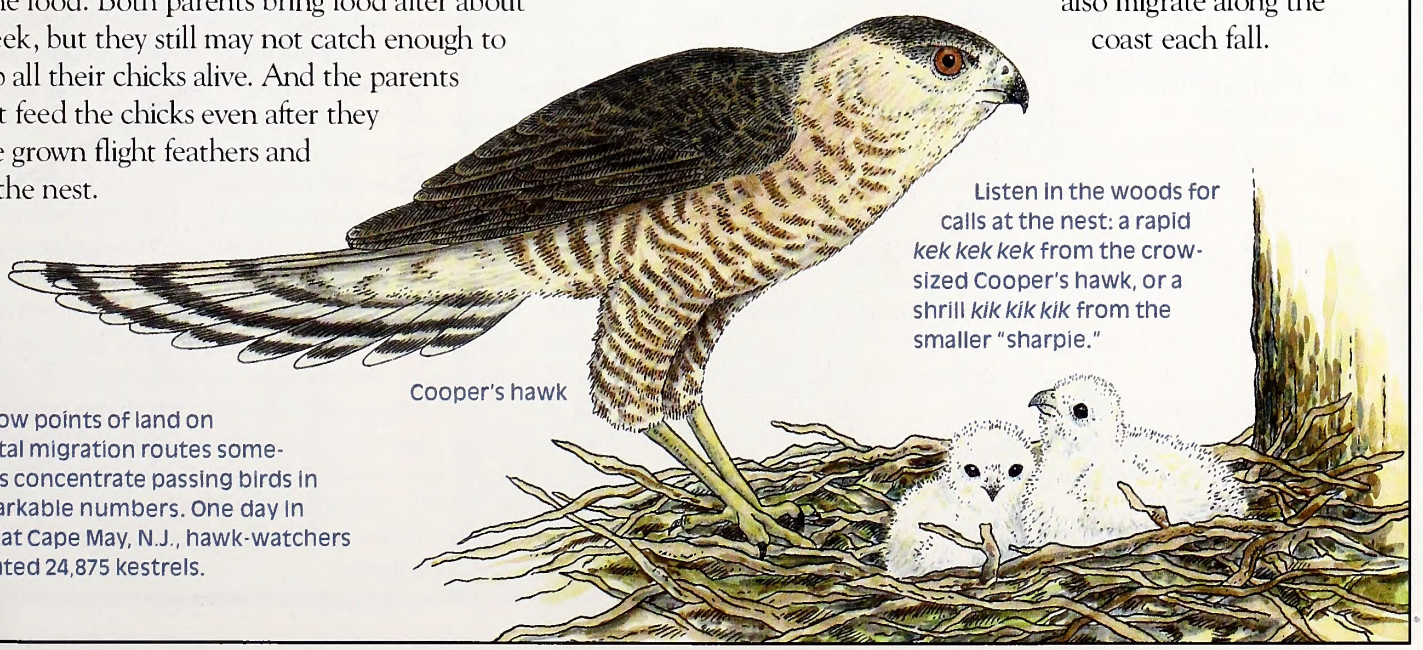
sharp-shinned hawk

WIND MASTERS

The young birds' toughest test lies ahead, for the onset of autumn urges them to migrate south. They must leave familiar habitat to travel vast distances, risking death from starvation, fatigue or predators. Most juvenile hawks and falcons die before they reach adulthood.

Migrating raptors ride the fall winds along specific routes. Some follow the Appalachians or other mountain ridges, riding high on rising columns of warm air. Birds soar to the top of each **thermal,** then glide to the next one, rarely needing to beat their wings. Each fall, thousands of migrating hawks, eagles and vultures ride these rivers of air.

Small hawks and falcons, though, prefer another roadway: coastlines. The Atlantic shoreline gives birds an easy-to-follow path south, so watchers along North Carolina's Outer Banks may see kestrels, peregrines, merlins, Cooper's hawks or—especially—sharp-shins. Many of these birds pause on their journeys to rest and refuel, snacking on warblers and shorebirds that also migrate along the coast each fall.



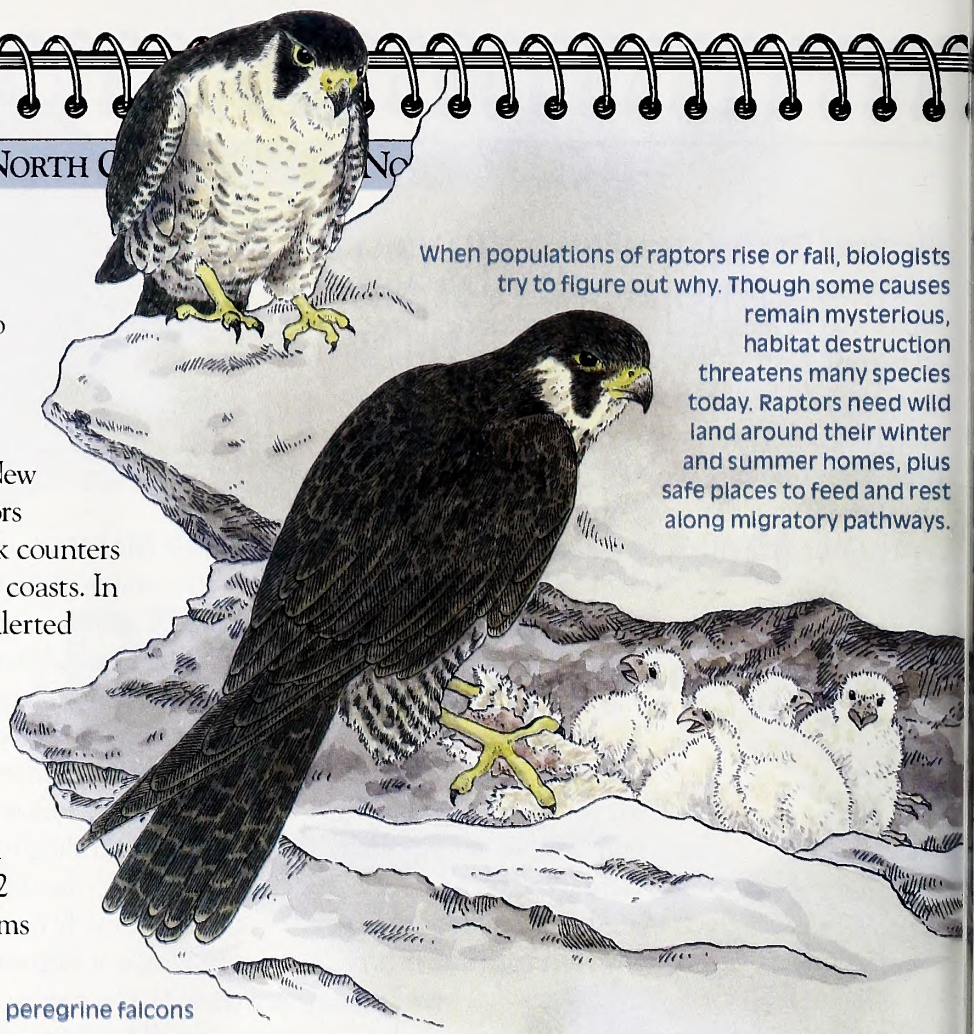
Cooper's hawk

Listen in the woods for calls at the nest: a rapid *kek kek kek* from the crow-sized Cooper's hawk, or a shrill *kik kik kik* from the smaller "sharpie."

Narrow points of land on coastal migration routes sometimes concentrate passing birds in remarkable numbers. One day in 1970 at Cape May, N.J., hawk-watchers counted 24,875 kestrels.

Small Birds, Big Problems

A century ago, hunters waited on ridges and coastal peninsulas, eager to shoot passing hawks. People blamed birds of prey for killing livestock, and governments paid bounties for dead "chicken hawks" and other raptors. New laws and better attitudes toward raptors allowed the birds to recover, and hawk counters replaced hawk shooters on ridges and coasts. In the 1960s, careful migration records alerted biologists to shrinking raptor populations. Insecticides such as DDT were poisoning many species, thinning their eggshells so that few chicks hatched. Peregrine falcons were wiped out in the eastern United States, and it took a DDT ban in 1972 and peregrine **reintroduction** programs for the birds to recover.



When populations of raptors rise or fall, biologists try to figure out why. Though some causes remain mysterious, habitat destruction threatens many species today. Raptors need wild land around their winter and summer homes, plus safe places to feed and rest along migratory pathways.

peregrine falcons

What Does It Mean?

cavity nesters: birds that build their nests in tree holes, nest boxes or other enclosures
diurnal: active during the day
raptors: birds of prey, or birds that kill and eat vertebrate animals
reintroduction: returning wild animals to their native habitat
stoop: a rapid dive to capture prey
talons: long, sharp claws on a bird's feet
thermal: a column of warm air rising from the earth's hot surface

Read and Find Out

- *Birds of Prey (Peterson Field Guides for Young Naturalists)* by Jonathan Latimer and K.S. Nolting, Houghton Mifflin, 1999.
- "Finding a Hawk Watch" by Paul Kerlinger, *Bird Watcher's Digest*, September/October 1996.
- *How to Spot Hawks & Eagles* by Clay Sutton and Patricia Taylor Sutton, Chapters Publishing, 1996.
- *North American Birds of Prey* by Clay Sutton and Richard K. Walton, Knopf, 1993.
- *The Wind Masters: Lives of North American Birds of Prey* by Pete Dunne, Houghton Mifflin, 1995.

In *Wildlife in North Carolina*:

- "Appalachian Wind Surfers" by Lawrence S. Earley, September 1982.
- "Shadows in the Woods" by David S. Lee, January 1994.
- "Hawks on a Fall Wind" by David S. Lee, September 2000.

Get Outside

Build a Kestrel Nest Box: Kestrels readily use boxes that are built to meet their needs and placed in appropriate habitat. For detailed instructions, consult *The Complete Birdhouse Book* by Donald and Lillian Stokes (Little, Brown & Company, 1990).

Watch Your Bird Feeders: Sharp-shins and Cooper's hawks are the birds of prey most likely to go after visitors to your feeder. Look for clues that the hawks are around—songbirds around the feeder may freeze or fly off suddenly. Seeing a chickadee at your feeder caught by a hawk may be upsetting at first, but remember that predators need to eat too.

Follow the Mob: Crows and other birds "mob" or harass birds of prey, perhaps to drive them out of the area. Listening for cawing crows and other noisy bird crowds chasing another bird through the sky is one of the best ways to find hawks and falcons.

Visit a Hawk-Watch Site in the Fall: The best way to learn how to identify hawks and falcons is to see lots of them. Listen to the naturalists and veteran bird-watchers on hand; they'll talk about flight patterns, bird shapes and other ways to tell species apart. Take along binoculars, a hawk identification guide and a notebook for sketching and note-taking so you can review what you learned later. Sites in North Carolina include Mahogany Rock Overlook on the Blue Ridge Parkway and the Pea Island National Wildlife Refuge on the Outer Banks.

It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Quick Frozen Critters: teaches students about the importance of adaptations in predator-prey relationships.

Birds of Prey: teaches students to interpret data, and to generate and test hypotheses related to birds of prey.

Seeing Is Believing or The Eyes Have It!: teaches students to identify different kinds of vision as an example of animal adaptation.

Get WILD

Advanced WILD Workshops:

July 10-11 – *Wild About Elk*, Purchase Knob, Great Smoky Mountains National Park. Contact Susan Sachs, (828) 497-1908.

Oct. 12-13 – *Piedmont Habitats*, Blue Jay Point County Park, Raleigh. Contact Blue Jay Point, (919) 870-4330.

Editing and design by Consie Powell

Five Small Raptors: A Matching Game

Copy art twice to make 10 cards. Cut out the cards and cut each in half. Shuffle and spread out, face down.

- First player: turn one card face up. Turn another card up. If they match, keep them and play again. If different, put both back face down.
- Now second player tries the game.
- Continue until all the cards are matched and taken.

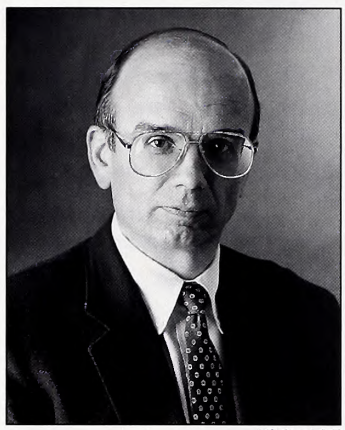
Division of Conservation Education Chief Bids Farewell

Sid Baynes, chief of the Division of Conservation Education, recently retired, after serving 31 years with the N.C. Wildlife Resources Commission.

A graduate of N.C. State University, Baynes started his career in 1970 as a wildlife field biologist. He was later promoted to assistant chief of the Division of Wildlife Management, but truly found his calling when he was named chief of the Division of Conservation Education in 1976.

Created by Clyde Patton, the first executive director of the Wildlife Commission, the Division of Conservation Education became part of a "Five-Point Program" to turn around what, at that time, were beleaguered wildlife populations. Enforcement, Management, Research, Regulation and Education were and still are the core principles of the Wildlife Commission.

As head of the Education Division, Baynes spent a career spreading the gospel of science-based wildlife conservation. He oversaw the modernization of *Wildlife in North Carolina* magazine, increasing the size of its staff, adding more color and pages to the publication, developing educational products to sell in its N.C. WILD store section and increasing the magazine's circulation.



MELISSA McGAW

***Sid Baynes, chief** of the Division of Conservation Education, recently retired after serving the Wildlife Commission for 31 years.*

He also took a lead role in the development and expansion of the N.C. WILD program. Through this program, field personnel have now trained more than 40,000 North Carolina educators in ways to use natural resources and ecological concepts to supplement the teaching of traditional school subject areas.

Most recently, Baynes realized one of his dreams with the dedication of the very popular Pisgah Center for Wildlife Education, located in the Pisgah National Forest, in Transylvania County. More than 100,000 people a year now visit the center where they learn about their connection to the natural world and why wildlife conservation programs, and the hunters and anglers who support them, are so important.

In addition, he has helped lay the groundwork for two other centers to be built within the next three years. The Outer Banks Center for Wildlife Education will be located in Currituck County adjacent to the historic Whalehead Club. The Centennial Campus Center for Wildlife Education will be located in Raleigh on the campus of N.C. State University.

Richard Hamilton, chief deputy director of the Wildlife Commission, credited Baynes with helping to create a division that will continue to educate millions of North Carolinians about wildlife conservation.

"The Wildlife Commission recognized early on that it could not succeed without public understanding and involvement," Hamilton said. "That has been the role of the Division of Conservation Education, and we are fortunate to have had Sid Baynes at that helm for so long."

During Baynes' tenure as chief, the education division's programs assumed a role of national prominence, receiving more than 100 awards and recognitions.

Reflecting on his career, Baynes said, "It's really been like a wonderful dream that passed in a blink of an eye. How fortunate I have been to get the opportunity to serve an agency I love and a purpose to which I feel called. And to do this in the most beautiful state in the country with so many talented and dedicated people, I have been truly blessed."

—Chris Powell

Edited by Chris Powell

On Patrol

***Editor's note:** Listed below is a report of a situation that exemplifies the always-unpredictable nature of a North Carolina wildlife enforcement officer's duty.*

Sgt. Perry Smith recently responded to a report of a deer trapped at the bottom of a steep-banked containment pond in Union County. The small deer was near exhaustion after swimming around in the pond for a considerable amount of time. Summoning his best John Wayne impersonation, Smith lassoed the animal and removed it from the pond. Then he placed the deer on a burlap bag and allowed it to rest in a sunny area. The deer soon recovered and trotted away. (The officer rode off into the sunset.)

Boat Registration Renewals Go On-line

In a continuing effort to simplify licensing and registration processes, the N.C. Wildlife Resources Commission recently added on-line vessel registration renewals to its Web site.

The secure system allows vessel owners to use a credit card to renew registrations for three years.

"This is just one more step the Wildlife Commission is taking toward making licensing and registration as convenient as possible to the public," said Janice Underwood Hodges, the Wildlife Commission's information technology chief. "We will continue to look to the Web as a means of simplifying the many dealings the public has with the Wildlife Commission."

Sixty days prior to the expiration of each registration, vessel owners will receive a renewal notice with instructions for renewing on-line. Use of this service requires the renewal number and registration number shown on the notice.

Registration cards and decals will be mailed to the owner within three business days of the on-line renewal.

For more information on vessel registration and titling, visit us at www.ncwildlife.org.

—Chris Powell

EFNC Reaches 10th Anniversary

No longer a slender sapling, the Environmental Federation of North Carolina has grown its 10th annual ring.

The 29 independent organizations that comprise EFNC—from Audubon of N.C. to Trout Unlimited, and river keepers to land conservators—marked the anniversary April 25 with a celebration in downtown Raleigh's Archdale Building, home of the state's environmental regulatory agencies.

"I'm glad to have been a member of a number of these organizations," Bill Ross, new secretary of the N.C. Department of Environment and Natural Resources, told the assemblage. "You're making a difference, and it's great."

EFNC funding has helped protect more than 30,000 acres across the state as farmland, natural preserve or wildlife habitat. Member agencies have undertaken dozens of cleanup projects from the mountains to the coast and reached more than 1 million schoolchildren with a message of environmental stewardship.

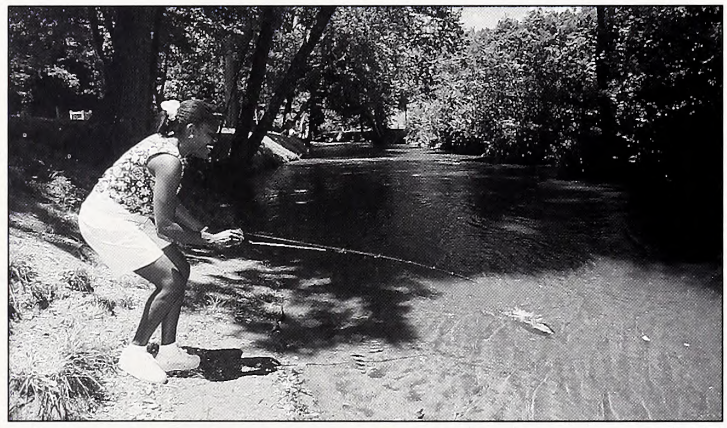
Payroll deductions—now available through more than 500 employers—have raised $2.1 million over 10 years. About 85 cents of every dollar contributed to EFNC goes directly to the member non-profits.

"It's all gone toward environmental programs and services that have benefited every single resident of North Carolina," said Jill Lewis, EFNC's new executive director. She replaces Keith Burwell, who stepped down earlier this year after leading the federation through its germination and first 10 years.

EFNC began in 1991, encouraged by the Z. Smith Reynolds Foundation, as a means to take fund-raising pressures off environmental groups. It was to be a single trunk that provides a sturdy financial base and efficiently nourishing roots for its 29 branches—17 initially.

That model still guides EFNC, as it strives to enable its constituent organizations to protect North Carolina's natural resources, making life better for us all.

Women Anglers on the Rise



KEN TAYLOR

Hold on tight! Statistics show that *women are increasingly becoming involved in fishing.*

Here's a message to mothers and daughters out there—fishing isn't just for the guys anymore. In increasing numbers, women are realizing that fishing is great fun not only for themselves, but for the family as well.

Statistics show that only about a third of all anglers are women. However, the perception that fishing is a male-dominated sport appears to be changing. Roughly 13 million women now fish, a 5 percent increase from 1998 to 1999, according to the National Sporting Goods Association.

"Fishing is the least discriminating sport in the world," says Kathy Magers, a 20-year professional angler. "No one is prevented from doing it. Most of all, we can still be 'ladies' and enjoy this sport."

—Courtesy of the American Sportfishing Association

2000 Seafood Catch Dives, Markets Thrive

KEN TAYLOR

***Commercial fishing** landings suffered their second-lowest catch in 27 years, according to the N.C. Division of Marine Fisheries.*

The state's commercial fishermen landed 154.1 million pounds of fish and shellfish last year—the second-lowest catch in the last 27 years, according to the N.C. Division of Marine Fisheries.

Though the catch was down, the market value soared to the third highest on record at $108.3 million. By comparison, the average market value for the previous five years was $105.1 million.

Landings fluctuate for a variety of reasons. The amount of seafood harvested can depend on availability of fish or shellfish, market conditions, harvest restrictions and shifts in consumer tastes.

Hard blue crabs experienced the most troubling harvest decline. North Carolina still leads the nation in the production of blue crabs, but in 2000 the catch plummeted to 38.8 million pounds, well below the previous 5-year harvest average of 57.1 million pounds. Hard crabs continued to be the state's top money seafood catch in 2000, bringing in $32.1 million, compared to the previous 5-year value average for hard crabs of $36 million.

Hard crab catches varied with normal or above-average landings in the Albemarle Sound and southern coast, but based on the previous 5-year average, catches decreased by 46 percent in the Neuse, Pamlico and Pungo rivers, as well as the Pamlico Sound. It is unclear if this decrease can be attributed to the impact of Hurricane Floyd.

Shrimp catches remained solid in 2000 with 10.3 million pounds harvested, which was the third highest landing of shrimp on record. The value of shrimp totaled $25.4 million—well above the previous 5-year value average of $16.9 million.

The top five species harvested by weight were:

- Atlantic menhaden, 56.3 million pounds
- blue crabs (hard), 38.8 million pounds
- shrimp, 10.3 million pounds
- Atlantic croaker, 10.1 million pounds
- spiny dogfish shark, 3.5 million pounds.

Values are ex-vessel, which is the amount fishermen are paid for their catch.

Tar Heel commercial fishermen also hauled in 1.7 million pounds of tuna valued at $3.4 million—the second highest recorded harvest in the state, and much higher than the previous 5-year value average of $1.4 million. Last fall's cooler temperatures off the New England coast caused bluefin tuna to migrate earlier than usual, giving North Carolina fishermen the opportunity to catch the popular fish before the coast-wide harvest quota was reached.

Record-breaking landings of yellowfin tuna, dolphin and southern flounder helped recreational anglers reel in their largest catch in 12 years, with an estimated 21.2 million pounds of fish landed recreationally in 2000.

—Courtesy of the N.C. Division of Marine Fisheries

Wildlife Commission Game Lands Expand

The N.C. Wildlife Resources Commission recently added nearly 27,000 acres of public hunting/fishing land, including the addition of four new game lands.

New for the 2001-02 season are Cold Mountain Game Land in Haywood County (3,295 acres), Van Swamp Game Land in Beaufort and Washington counties (5,482 acres) and Brunswick County Game Land (1,139 acres). The 1,740-acre Roanoke Island Marshes Game Land in Dare County will be a permit-only area; however no permits will be issued for the 2001-02 season.

Additions to existing game lands include: 570 acres to the Roanoke River Wetlands and Roanoke River National Wildlife Refuge Game Land; 1,000 acres to the New Lake Game Land; 5,943 acres to the Gull Rock Game Land; 252 acres to J. Morgan Futch Game Land (formerly Little Alligator River Game Land); 1,806 acres to the Bachelor Bay Game Land; 63 acres to the Northwest River Marsh Game Land; 2,397 acres to the North River Game Land; 101 acres to the Currituck Banks Game Land; 57 acres to the Butner-Falls of the Neuse Game Land; 2,178 acres to the Green River Game Land; and 912 acres to the South Mountains Game Land.

Locations of all game lands can be found in the 2001-02 *North Carolina Game Lands* booklet. Those wanting to hunt, trap or fish on Wildlife Commission-managed game lands should refer to the *2001-02 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* or see the regulations portion of the Wildlife Commission's Web site—www.ncwildlife.org.

—Doug Howel

Deer Harvest Up During 2000-2001

The reported number of deer harvested by hunters during the 2000-2001 season was 5.7 percent higher than the number taken during the previous season.

A total of 132,235 deer was taken this past season, with the majority comprised of antlered bucks (72,632), followed by does (51,696) and button bucks (7,907). Wildlife Commission game lands accounted for 6,266 of the total deer harvest.

Bald Eagles Favor Chatham County

Recent information collected on bald eagles indicates that Chatham County is now home to five eagle nesting territories, more than in any other county in the state.

The Nongame Section of the Wildlife Commission currently tracks 46 eagle nesting territories in the state. Although all of these territories will not have successfully breeding pairs in any given year, the number of active eagle nests is increasing almost every year.

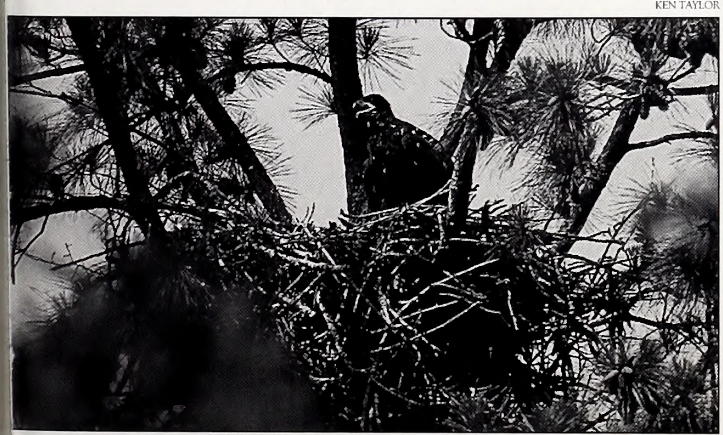
Eagles arrive in North Carolina from the North between October and December. Eggs are laid in February, and the young will fledge from the nest around May. Although all data has not yet been collected for the 2001 nesting season, nine new eagle nests have been documented this year. Davidson, Gaston, Bladen, Harnett and Chatham counties were found to contain one new eagle nest each, while Orange and Halifax counties both had two new nests.

"The future for bald eagles in North Carolina looks bright," said David Allen, the Wildlife Commission's coastal nongame project leader. "It was only 17 years ago that we found our first eagle nest in the state, following the ban on DDT (an insecticide banned in 1972, after being found harmful to animals). Now it's quite a job trying to collect information on all the nesting pairs."

The U.S. Fish and Wildlife Service is evaluating the possibility of taking the bald eagle off the federal list of threatened and endangered species. The bird is now listed as federally threatened.

—Division of Wildlife Management

KEN TAYLOR



Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

July 7-14

Happy Trails Week at the Cradle of Forestry in America National Historic Site, Pisgah Forest. Activities throughout the week include guided hikes, fly-fishing, orienteering, wilderness survival, even tea with llamas! Call (828) 877-3130, or visit the Web site, www.cradleofforestry.com.

July 9-13

A Week in the Woods, offered by the Pisgah Center for Wildlife Education, Pisgah Forest, is for children ages 10-15 interested in learning more about their natural surroundings. Topics include nature journaling, tracking, tree identification, stream investigation and compass use. The week-long program starts each day at 9 a.m. and ends at noon. Call (828) 877-4423.

July 13-15

The Carolina Whitetail Hunting and Outdoor Show will be at the Greensboro Coliseum. Call (336) 373-7400.

July 14

Learn the basics of fly-fishing in a single Saturday morning, 8:30 a.m.–12:30 p.m., at the Pisgah Center for Wildlife Education, Pisgah Forest. This workshop is for ages 16 and up. The fee is $10, equipment provided. Call (828) 877-4423.

July 20-22

The Edenton Bay Challenge is a sailboat regatta at the Edenton waterfront, with participation by Sunfish, Moths, Tanzers, Thistles and Flying Scots craft. Call (800) 775-0111.

July 28

Learn how not to get lost in the woods. The Pisgah Center for Wildlife Education, Pisgah Forest, presents this survival techniques workshop for ages 12 and up, stressing prevention, equipment to take with you and—just in case—what to do if you do get lost. Call (828) 877-4423.

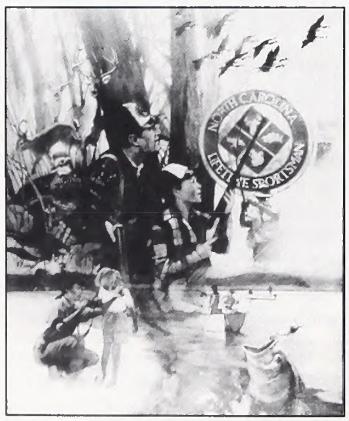
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through April 2001

Principal Balance
$32,291,875.73

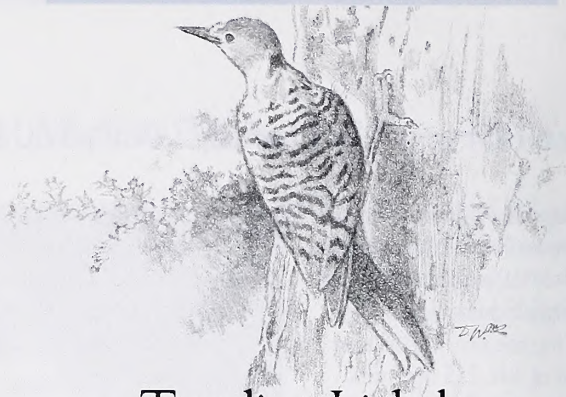
Interest Earned
$33,123,719.38

Total Receipts
$65,415,595.11

Interest Used
$21,326,178.04

Fund Balance
$44,089,417.07

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax-deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Treading Lightly

by Rodney Foushee

There is no doubt that we humans have a profound impact on wildlife populations through our everyday actions. Here are a few tips to lessen the impact on your property.

Pets and Wildlife: Each year hundreds of millions of wild birds and small mammals are killed by free-roaming cats and dogs in the United States. Though we can't change our pet's instinct to hunt and kill wildlife, cat and dog owners can stop the carnage by simply keeping their pet under control at all times. Cats should be kept inside at all times, and dogs should be fenced in or chained to prevent roaming. It is also important to neuter pets at an early age to reduce their tendency to roam and avoid unwanted kittens or puppies.

Safer Antifreeze: Traditional antifreeze for cars, even in tiny doses, is a potent poison for wildlife. Because of its sweet taste, animals are attracted to it. To prevent accidental poisonings, make sure you thoroughly clean up any spills from your vehicle and properly dispose of used antifreeze. A safer option is to use animal-friendly antifreeze. This safer antifreeze is readily available at your local auto supply store.

Eliminate Fescue: Though it is popular with farmers and homeowners alike, fescue grass has little if any value for wildlife. Consider reducing the size of your lawn by converting part or all of the fescue to natural areas with native trees, shrubs and grasses. Besides cutting your mowing time and reducing your use of fertilizer, the conversion will provide excellent habitat for many wildlife species.

Reduce Pesticide Use: Despite the banning of many potent pesticides, million of birds and other wildlife still suffer from pesticide exposure in this country every year. And pesticide use is at a record level—nearly 4 million tons of pesticides are applied to lawns, gardens, crops and homes nationwide each year.

First, consider the alternatives before applying chemicals. You can release beneficial insects into the garden, compost to build healthy soil, mulch and hoe to control weeds, plant native plants and natural areas to replace lawns and rotate vegetables in the garden each year. You can also eliminate conditions that attract many pests including not stacking wood directly on the ground or near the house, draining standing water and mowing existing grass often and high.

N.C. WILD STORE

NEW!

The latest poster in our Amphibian series with the N.C. Herpetological Society

SALAMANDERS *Part 1*

Hidden along streams, in caves and under vegetation, more than 50 different species of salamanders carry out their unique life cycles in North Carolina. This first poster of a three-part set on North Carolina's salamanders features the 13 species in six families that have lungs or gills. Habitat and life cycle notes accompany a color photograph for each species. This captivating educational poster for school or home fits 24" x 36" stock frames. (The other two posters in this set will be available later this year.)

$6 ITEM CODE **P19**

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds

This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. Third in the "Sporting Heritage" series. 22" x 34".

$10 ITEM CODE **P18**

Waterfowl Decoys of North Carolina ▲

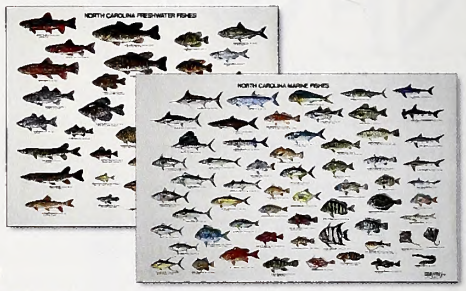
Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34".

$10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians ▲

Sixteen traditional trout flies are presented in stunning color detail. Each picture is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34".

$10 ITEM CODE **P13**



▶ Fishes of North Carolina

Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").

$10 ITEM CODE **P9**

Butterflies Poster Set ▲

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set. Guide also sold separately.

$2 ITEM CODE **M5**

Amphibians: Frogs of North Carolina Poster Set ▶

Set of two posters in full color: The Hylid Frogs & True Frogs and Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom. 22" x 34".

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

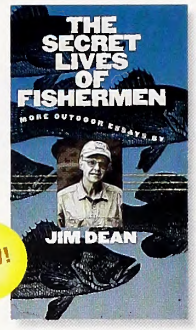
◀ Reptiles of North Carolina

Set of 4 posters in full color.

Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

$18 ITEM CODE **P10**

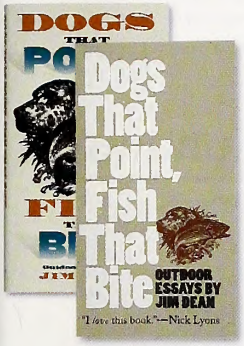
The Secret Lives of Fishermen ▶



NEW!

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound.

$24.95 ITEM CODE **M13**



◀ Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages.

Hardbound $19.95 ITEM CODE **M8**

Paperback $10.95 ITEM CODE **M12**

All Things Are Connected ▶

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.

$22 ITEM CODE **W3**

◀ Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.

$20 ITEM CODE **N9**

Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.

$2 ITEM CODE **M6**

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.

$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each

Cub & Boy Scout Correlation ITEM CODE **E9**

Girl Scout Correlation ITEM CODE **E10**

Pisgah Center for Wildlife Education T-shirt ▼

100% cotton beige tee with colorful design on back (featured here) and Pisgah logo on front. Adult sizes.

$14.50 ITEM CODES:

A8MED (medium)
A8LRG (large)
A8XLG (extra large)
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Wee Tees

Just like the adult shirt, only smaller.

ITEM CODES:

A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
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Wildlife in North Carolina Caps ▶

Exclusive designs and magazine logo are featured on four different cap styles.

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A11

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- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

A3

A7

A6

A1

◀ **N.C. WILD Caps.** N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.

$16.50 each

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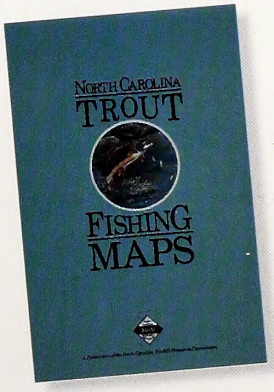
- Tan cap with burgundy bill. ITEM CODE **A10**

A10



◀ North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.

$12 ITEM CODE **TMAP**

◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

2000 Migratory Waterfowl Print and Stamp Set ▶

This limited edition print signed by artist Ron Louque depicts the grace and color of canvasbacks in flight at North Carolina's historic Whalehead Club. Your purchase will support the Wildlife Commission's efforts to manage wetlands and restore waterfowl populations. Overall size is 12" x 14"; image size 6 1/2" x 9". ***This item is not subject to 15% discount.***

$145 ITEM CODE **DSP00**

North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

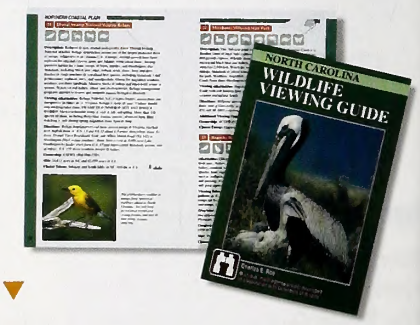
Explore the diversity of the state's natural communities in an 82-page soft-cover book written by naturalists and journalists. This guide describes 13 habitats across the state with captivating illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a North Carolina WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

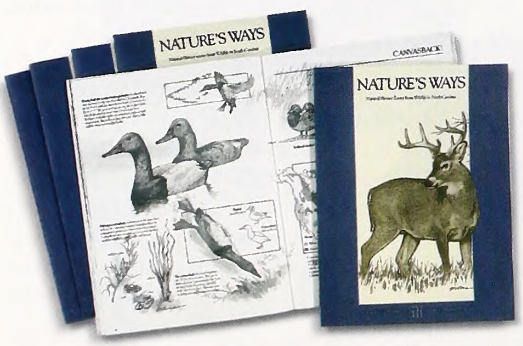
$16 ITEM CODE **E6**

North Carolina Wildlife Viewing Guide ▼

From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**





Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

Unboxed set. $27.50 ITEM CODE **M9**

N.C. Wildlife Profiles Binder & N.C. Wildlife Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**

WILDLIFE COMMISSION SPOTLIGHT

Mapping the Outdoors

Hunting/Trapping

Maps/Locations

With more than 2 million acres of public land available, the N.C. Wildlife Resources Commission is taking significant strides toward making access to these game lands as easy as possible for hunters, trappers and anglers. Recently, the Division of Wildlife Management placed maps of all the game lands on the Wildlife Commission's Web site: **www.ncwildlife.org**. From the Web site's home page, simply click on the Hunting/Trapping link, and you will have instant access to maps of every game land in the state.

Game Lands Index Map

1=Mountain
2=Piedmont
3=Coastal

Click on a number on the map to see an enlargement for that area.

Divided into three sections—Mountain, Piedmont and Coastal—a visitor can click on a region, then search by county for the tract of land that they desire access to. The maps can also be printed, providing a convenient guide to carry afield. In addition, important information can be quickly accessed, including types of game lands, available game species, camping locations and special hunt opportunities.

Tract boundaries, as shown in these maps, are not precise but are approximations of actual locations. Game lands are posted with signs to aid sportsmen in locating each tract, and users should identify boundaries on the ground before hunting, trapping or fishing. Also, be sure to refer to the Hunting/Trapping Regulations section of the Web site or the *N.C. Inland Fishing, Hunting & Trapping Regulations Digest* to identify regulations and exceptions specific to each game land.

Types of Game Lands

Special Hunts Available

Game Species Available

Game Lands Camping

Game Lands Map Book Publication

Game Lands Program Funding

Controlled Hunting Preserves

***Having accessed the** Web site, a visitor can click on one of the links above to get instant access to a wide variety of information about the Wildlife Commission's game lands.*

DALE DAVIS

***Prior to dove season,** Wildlife Commission personnel plant certain game land fields with sunflowers, millet and other wildlife plantings. In addition to providing for excellent shoots come September, these fields also give doves a place to rest and feed during non-hunting days.*

Final Transformation

After fattening up on pawpaw leaves during the spring, the caterpillar of the zebra swallowtail enters a chrysalis and emerges during the summer as a splendid adult (above). See page 4 for more on North Carolina butterflies.

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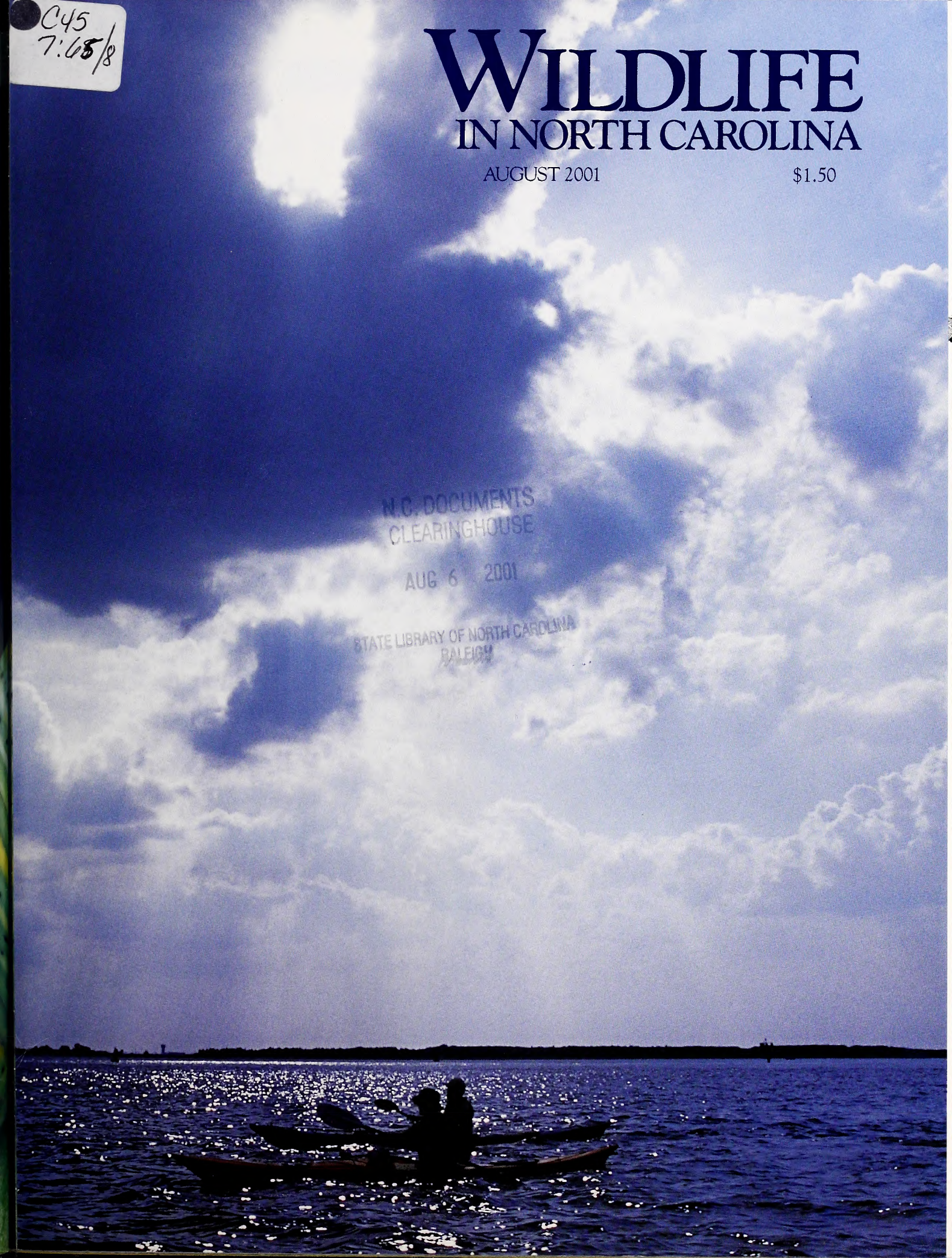
WILDLIFE IN NORTH CAROLINA

AUGUST 2001 $1.50



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The Case of the Missing Bass

by Jim Dean

Have you ever caught a bass that you knew, absolutely knew, was the largest in the pond? Even if you happen to land a double-digit whopper, there's always that bit of uncertainty, isn't there? I suppose we could call it the "Creature from the Black Lagoon" syndrome, this nagging suspicion that even larger leviathans are cruising around out there that have grown far too wary to be caught.

I suspect all fishermen share this belief—the hope of catching the fish of a lifetime soars with each cast and is surely at the core of our obsession. Furthermore, the tougher the fishing, the more certain we are that a fishing spot holds lunkers with doctorates in lure avoidance. And the presence of a "No Fishing" sign automatically adds 2 to 3 pounds to the pond's biggest suspected largemouth resident.

JIM DEAN

Recent events have caused me to question this notion. Last year, we drained a 2 1/2-acre pond at the family farm to clear out weeds and fallen timber, and also deepen it for irrigation. The fishing had also dropped off considerably in the past few years. The plan was to drain the pond, move those big, smart bass to a nearby pond, then restock the pond once it had refilled.

On a frigid January day, after the pond had been reduced to a large puddle about 2 feet deep, professors Jim Rice and Rich Noble brought a group of N.C. State University fisheries students to the pond to gain hands-on experience seining, electroshocking and weighing the various species. We were all curious to see what would turn up. My fishing buddies and I were convinced that we would find big bass—after all, we had been releasing sizable fish over the years.

As expected, there were lots of small panfish and crappies. The big surprise was finding only a few dozen 1- to 2-pound bass in the entire pond. The largest weighed only 5 1/2 pounds, and there were a few in the 3-pound class. Where were all those lunker largemouths?

"When good fishermen consistently fail to catch big bass in a pond, there's a good chance they simply aren't there."

Jim suggested that one of the problems was the infusion of undesirable species such as crappies, bullheads and golden shiners from another pond just upstream. These fish had come around the spillway and contaminated the stock in the pond we had just drained, hastening its decline. To avoid this problem in the future, the decision was made to drain and restock that upstream pond also.

This past May, I opened the valve in the second pond to begin draining it. Again, we figured we would find some large bass. Indeed, I would have bet big bucks on it.

Why was I so sure? On the afternoon I opened that valve, Mary Brady and I had walked the banks for about 30 minutes, casting plastic salamanders until a thunderstorm drove us off. In that short time, we had caught a 5-pound bass, a 3 1/2-pound bass and two smaller ones that we moved to another pond on the farm.

"Boy, I can't wait to see what comes out of here, especially after what we caught in such a short time today," I remarked.

Of course, you've probably guessed what happened. After the water level had fallen and rotenone was applied to kill the remaining fish in preparation for restocking, the biggest bass we found weighed only 4 pounds. Amazingly, during that 30-minute period, Mary and I had managed to catch two of the three largest bass in the pond, including the 5-pounder, which had been the biggest!

There's not space to speculate on all the possible reasons these ponds had fallen on hard times, and the biological data aren't complete yet. Still, some conclusions seem depressingly inescapable. When good fishermen consistently fail to catch big bass in a pond, there's a good chance they simply aren't there. Fish populations in ponds get out of balance, especially in ponds that aren't carefully managed. Panfish and undesirable species become stunted and compete for food. Bass reproduction suffers because the eggs are often eaten, and small bass must compete with so many stunted panfish for food that few may reach the size to profit from all that small forage.

Of course, some older ponds do yield the occasional lunker bass. But a good catch now and then may not prove anything, because bass feed aggressively under favorable conditions and may give anglers a false impression of the health of a pond. Certainly I got the wrong impression this past May.

But leave it to your fishing buddies to put things into perspective. "If you guys were really good anglers," remarked Malcolm Finleyson, "you'd have caught that 4-pounder, too."

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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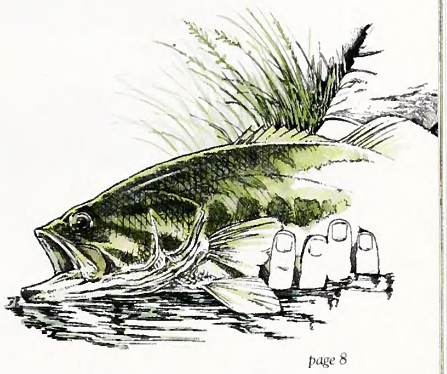

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Cover *Three paddlers make their way past Shackleford Banks in Carteret County. Photograph by Scott Taylor.*

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A Golden Community

written by Clyde E. Sorenson
illustrated by David Williams

Every year about this time, two natural phenomena occur: Those of us afflicted with hay fever begin sneezing, and the roadsides and old fields in North Carolina become speckled with patches of brilliant-yellow goldenrod. Although many of the sneezers blame goldenrods *(Solidago)* for their discomfort, the golden flowers are innocent; they just happen to bloom at the same time as the real culprit—ragweed *(Ambrosia)*. For many wildlife species, the arrival of the goldenrod flowers is the highlight of the year. And some of these species are specially adapted to live among the gilded blooms.

About 40 species of goldenrod occur in North Carolina, give or take a few (the taxonomic relationships between some species are not well understood). All are perennial, and individual species range in height from 18 inches to 7 or more feet. Most have roots that send up new shoots each year. In some species, these rhizomes are short and the plants form a dense clump; in others, the rhizomes are long and the plants form spreading colonies. Most species bloom between July and October, although at least one species blooms as early as April. The tiny yellow flowers on most species form loose-to-dense heads, and the shape of the flower head can be one key to identifying the species.

Goldenrods, like most plants with flashy floral structures, are insect-pollinated. Insects and other animals find the dense showy flower heads quite easily. Ragweed flowers, on the other hand, are inconspicuous greenish things that rely on wind to transport their pollen. People develop allergies to the lightweight ragweed pollen because it is released in large quantities, travels long distances through the air and is easily inhaled. Goldenrod pollen, however, is far too heavy and sticky to travel any distance on the wind.

Goldenrod flowers open for several weeks each year. Pollinating insects flock to them because of their heavy loads of pollen and nectar. Although some butterflies, particularly some of the skippers, are drawn to goldenrods, the flowers are most attractive to a number of bees, wasps, flies and beetles. Virtually every patch of goldenrod will have a complement of soldier beetles. These insects resemble firefly beetles without the light organs. They feed voraciously on the pollen in goldenrod flower heads, and their yellow-and-brown coloration serves as camouflage. Occasionally, you may notice a dead soldier beetle high on a flower cluster; it probably succumbed to a fungus that causes it to move to an exposed location just before it dies. Another beetle commonly found on goldenrod is the yellow-and-black-striped locust borer. These wasp mimics hang out in goldenrod munching pollen between bouts of egg-laying in nearby locust trees.

All the pollinators drawn to the goldenrod attract predators. Nestled in among the golden flowers, 3/8-inch-long, yellow-and-brown ambush bugs wait patiently for other insects. Flowery outgrowths on their wings, legs and abdomens enhance their camouflage, and they can be very difficult to spot. When another insect moves into their patch of flower, ambush beetles pounce on their prey and suck it dry. Flower-dwelling crab spiders, slightly larger than the ambush bugs, use the same hunting strategy. They acquire a brilliant yellow coloration that allows them to hide among the goldenrod flowers; the same species may be bright pink or stark white on other kinds of flowers. Both of these tiny predators are ferocious for their size and can subdue insects as large as bumblebees and locusts.

In addition to these specialists, many other predators hunt in and around goldenrod flowers. Brown paper wasps and yellow jackets attracted by the nectar and pollen often nab their fellow pollinators. Green lynx spiders lurk at the edges of flower heads, and Carolina and Chinese mantids also stalk the flower masses. Even some vertebrates partake of the insect smorgasbord. Ruby-throated hummingbirds will delicately snatch small insects from goldenrod heads.

It may be time to reconsider the value of goldenrods to our landscape and ecosystems. Several species are highly regarded garden plants in Europe, even though most North Americans regard these valuable natives as weeds. A number of nurseries offer various species for garden plantings. Perhaps a few would brighten your yard and diversify the wildlife inhabiting it.

Clyde E. Sorenson is an assistant professor of entomology at North Carolina State University.

Other Reading:

- W.G. Abrahamson and A.E. Weis, *Evolutionary Ecology Across Three Trophic Levels: Goldenrods, Gallmakers, and Natural Enemies* (Princeton University Press, 1997).
- R.T. Peterson and M. McKenny, *A Field Guide to Wildflowers: Northeastern and North-Central North America* (Houghton Mifflin, 1987).
- A.E. Radford and H.E. Ahles, *Manual of the Vascular Flora of the Carolinas* (University of North Carolina Press, 1968).

Surfing the Web

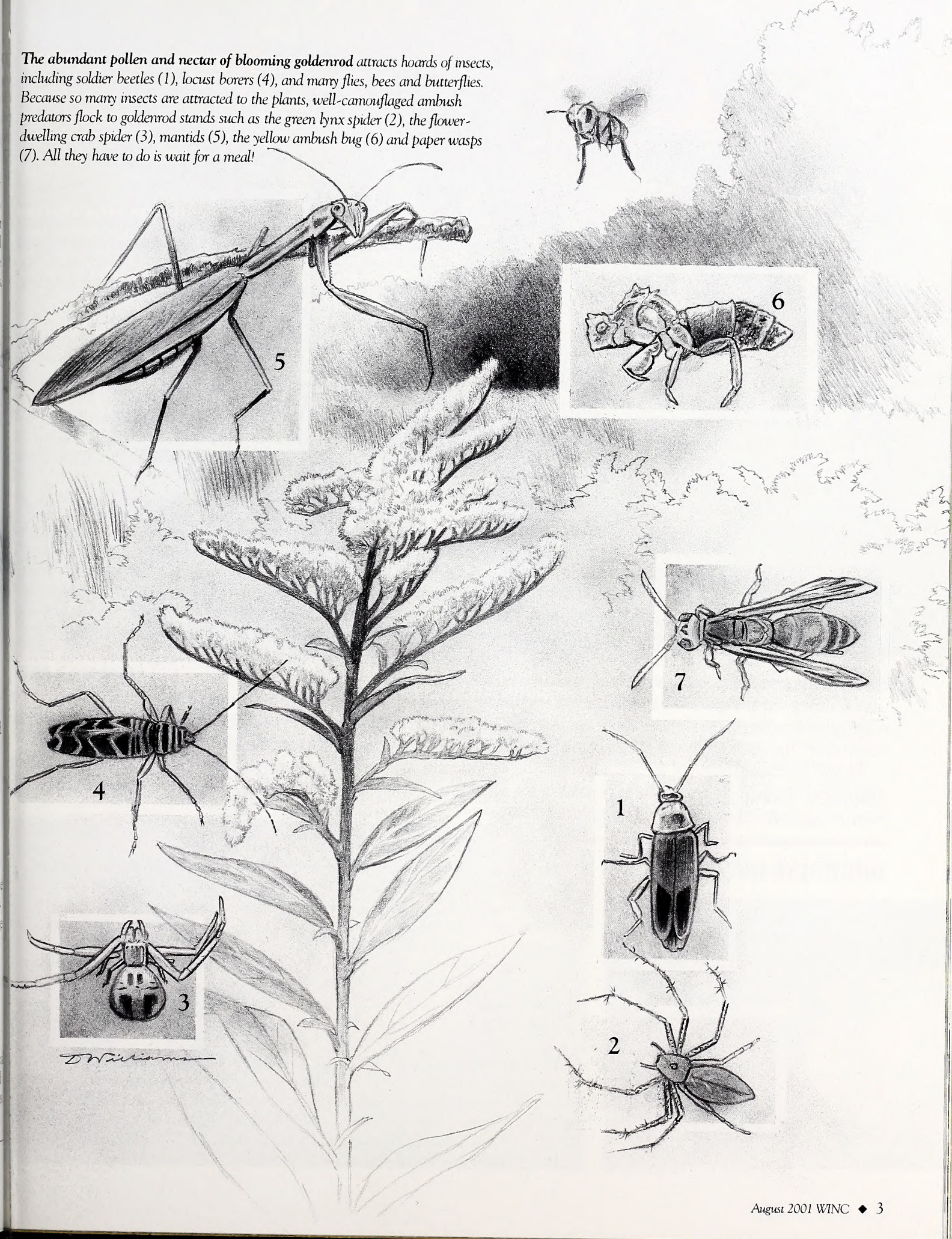
This Web site provides information about landscaping with native plants:

- http://www.epa.gov/glnpo/greenacres/nativeplants/index.html

For a description of goldenrods and links to U.S. Department of Agriculture sites that contain information on different species, visit the following Web site:

- http://2bnthewild.com/plants/H247.htm

The abundant pollen and nectar of blooming goldenrod *attracts hoards of insects, including soldier beetles (1), locust borers (4), and many flies, bees and butterflies. Because so many insects are attracted to the plants, well-camouflaged ambush predators flock to goldenrod stands such as the green lynx spider (2), the flower-dwelling crab spider (3), mantids (5), the yellow ambush bug (6) and paper wasps (7). All they have to do is wait for a meal!*



INSIDER'S GUIDE TO PERMIT HUNTS

written by Rodney Foushee
photographed by Melissa McGaw

Looking for a chance at a high-quality hunt on public land? Consider applying for one of the Wildlife Commission's special permit hunts.

All I could make out over the static of the cheap handheld radio was a single word—BIRD! But the lone shotgun blast, which had just pierced the silence of the creek bottom, told me volumes. My buddy Chris had taken a shot on a wild turkey.

We were hunting near Butner this past spring on a special permit hunt managed by the N.C. Wildlife Resources Commission. We had called to and chased gobblers from one end of the game land to the other. And the 18-pound tom turkey that Chris carried out of the woods that evening was icing on the cake.

Whether you're after waterfowl, doves, deer, wild turkey or small game, chances are the Wildlife Commission has a special permit hunt just for you. And all you have to do is register for a chance to win.

Sound too good to be true? Read on.

"These permit hunts serve several purposes," explains Carl Betsill, who oversees the special-opportunity hunts for the Wildlife Commission. "They reduce hunting pressure on crowded areas, allow us to better manage some wildlife populations and even hunt parks and areas that wouldn't be safe or practical under the general hunting rules. But most important, the special permit hunts provide average hunters with a chance at a quality hunt on public land."

That doesn't mean there aren't excellent hunting opportunities for hunters on general game lands. It's just that these permit hunts provide unique opportunities that aren't always possible on public land.

How does the drawing work? Suffice it to say that a computer generates a random list of the permit applicants based on their first hunt choice and then fills the slots available. Hunters can apply for permits individually or as parties, with essentially the same odds of being drawn. The result is a chance at a ticket to a high-quality hunt. (See "Applying for a Permit Hunt," p. 7.)

Though a complete listing of special-opportunity hunts, including deadlines and hunt dates, appears in the back of the current ***Regulations Digest***, here are highlights of some of the available permit hunts, including your odds of getting drawn (based on last season) and tips to improve your hunt if you do get drawn. Here's hoping you make the list.

MOURNING DOVES

Dove hunting can be a relaxing way to ease into the hunting season. With each permit dove hunt limited to 30 to 50 hunters (a maximum of five per party), there are plenty of acres of sunflowers and millet for everyone to pick out a decent place to shoot. The only catch is that the deadline for applying for the dove shoots is mid-August, so hurry up and get your name in.

ROANOKE RIVER WETLANDS DOVE HUNTS (Conoho Farms tract, Martin County, off N.C. 125 between Hamilton and Williamston). Item No. 503. Overall Odds of Being Selected: 89 percent. Application Deadline: Aug. 10. Lowdown: Bring plenty of shells, a good seat and a cool drink; you'll likely be in for an excellent shoot.

Insider Tips: Forego opening day as your first choice, and instead choose Labor Day or any following hunt date to increase your odds. Many hunters who choose later days get drawn for multiple hunts.

SUGGS MILLPOND DOVE HUNTS (Suggs Millpond Game Land, Bladen County, between N.C. 53 and N.C. 242 north of Elizabethtown). Item No. 507. Overall Odds 90 percent. Deadline: Aug. 10. Lowdown and Tips: Same as above.

WHITE-TAILED DEER

The Special Hunt Opportunities Program started with deer hunts 15 years ago, so it's no wonder there are so many permit deer hunts to choose from today. Here's a smattering of your choices.

ROANOKE RIVER DEER HUNTS (Roanoke River Wetlands Game Land and National Wildlife Refuge, 25,000 acres in Bertie, Halifax and Martin counties). Item Nos. 515, 516, 520. Overall Odds: 100 percent for nonquota hunts; varies for gun hunts. Deadlines: Available through season end for bow and muzzleloader; Sept. 15 for gun. Lowdown: If wilderness hunting is what you're after, look no farther than the Roanoke River. You can get away from other hunters and see plenty of deer and other wildlife in this rich place. This multiple-day hunt should give you plenty of time to get back to nature and have you wondering why you haven't done this sooner.

Insider Tips: Be prepared to bring in all necessary supplies via boat—there is no good road access to most of this area. Invest in a topo map of the area you will be hunting, and study it carefully. A GPS unit or compass can be a godsend in these wooded swamps, especially on overcast days. Most of the tracts border the Roanoke River, which has plenty of access via public and private boat ramps. With a valid hunting permit, you can camp within 100 yards of the river.

DUPONT STATE FOREST DEER HUNTS (Dupont State Forest Game Land, 8,400 acres in Henderson and Transylvania counties). Item No. 517. Overall Odds: 96 percent. Deadline: Aug. 20. Lowdown: This is a newly acquired game land in the heart of the southern Appalachian Mountains. Hunting with all weapon types is by permit only, with a maximum party size of five hunters.

Insider Tips: This property contains numerous hiking trails. Scout before the hunt to avoid high-traffic areas. Call (828) 251-6509 for maps and additional information about the game land. Access behind closed gates for disabled hunters can be gained by calling ahead.

MECKLENBURG COUNTY DEER HUNTS (Mecklenburg County Park and Recreation tracts, two parks totaling 2,000 acres north of Charlotte and west of Huntersville). Item No. 520. Overall Odds: 63 percent. Deadline: Sept. 15. Lowdown: These are three-day hunts to reduce deer numbers in two parks that receive no other hunting pressure. So, if you are looking for a high-probability chance at taking a deer, these hunts are for you. These are shotgun, slug-only- and muzzleloader hunts. All hunters must be at least 16 years old and attend a safety orientation the day before the hunt.

Insider Tips: Though 25 permits are issued for each park, Latta Plantation is roughly twice as large as Cowan's Ford. Also, prehunt scouting at Cowan's Ford is restricted to the orientation day. ATVs are allowed in both parks to retrieve deer after 11 a.m.

WATERFOWL

The Wildlife Commission, along with several partners, provides a veritable cornucopia of special permit duck hunts. The range extends from bare-bones swamp hunts to corn-and-millet impoundments to first-class shore- and open-water blind adventures on Currituck Sound. Though the selection is wide, the commission takes great pains to limit the number of hunters at each site. And as any waterfowler worth his waders knows, too many duck hunters in one area is the best way to spoil the hunt.

BUTNER-FALLS OF NEUSE WATERFOWL HUNTS (Butner-Falls of Neuse Game Land, four impoundments totaling 550 acres near Butner in Durham county). Item No. 567. Overall Odds: 99 percent. Deadline: Sept. 20. Lowdown: Who would locate waterfowl impoundments in the heart of the Piedmont? Answer: The Wildlife Commission, with plenty of help—and funding—from the U.S. Army Corps of Engineers. These diked-and-ditched engineering marvels were finished three years ago to offset the loss of wetlands from the construction of Falls Lake. Plant rows of corn and millet, then flood come fall, and you've got yourself a duck magnet.

Insider Tips: The Flat River impoundment, by far the largest of the four (246 acres), tends to draw the most ducks. The Beaver Dam impoundment has an excellent permanent blind for disabled sportsmen (the hunter must be drawn for the impoundment and possess a disabled-access permit). Instead of walking in, consider using a small boat or canoe to reach impoundments bordering the Flat River.

GOOSE CREEK WATERFOWL HUNTS (Goose Creek Game Land, impoundments totaling 1,050 acres in Beaufort and Pamlico counties near Hobucken). Item No. 560. Overall Odds: 63 percent. Deadline: Oct.1. Lowdown: These are three black needlerush impoundments bordering Pamlico Sound. Waterfowl hunting is by permit only on Saturdays, holidays and other high-pressure days. Stable boats with dependable motors are needed to access the Campbell Creek and Pamlico Point impoundments.

Insider Tips: Take care when wading the impoundments—the bottom is mucky and full of deep holes. Keep a close eye on the wind—a strong north or northeast blow can make the waters treacherously rough around Pamlico Point.

TYRRELL WATERFOWL HUNTS (J. Morgan Futch Game Land, 600 acres of impounded fields in Tyrrell County on U.S. 64, 7 miles east of Columbia). Item Nos. 532, 569. Overall Odds: 85 percent. Deadline: Sept. 1 for early hunts; Oct. 1 for late hunts. Lowdown: Both early- and late-season permits are offered on this large, easily accessible impoundment. The impoundment, which is flooded in stages, attracts large numbers of wood ducks, mallards, pintails, teal, ringnecks and swans.

Insider Tips: Chest waders will suffice for the impoundment, but a small canoe will give you access to a stand of flooded timber that's wrapped up in woodies and double as a sled for your decoys and equipment. Consider a $10 swan permit; you'll likely need it.

CURRITUCK WATERFOWL HUNTS (Currituck Banks Game Land and National Wildlife Refuge, Currituck County). Item No. 565. Overall Odds: 85 percent. Deadline: Oct. 1. Lowdown: This is a unique opportunity to hunt from one of 11 permanent blinds on the famed Currituck Sound. A boat is needed to reach all of the blinds. Unlike other permit hunts, there is no need to register as a party. Instead, the permit holder can bring two guests. All selected hunters must check in before the hunt. Standby drawings are held the morning of the hunt for blinds that were not claimed by permit holders.

Insider Tips: A GPS unit and a solid, shallow-draft boat are indispensable for finding and reaching the blinds in this massive, shallow sound. Beware the wind—Currituck can get a mite rough with a strong wind; and to double the trouble, the sound is dominated by wind tides. A strong north wind will blow the water clean out of the sound, and a south wind will create high tides. Apply for a swan permit, period.

RODNEY FOUSHEE

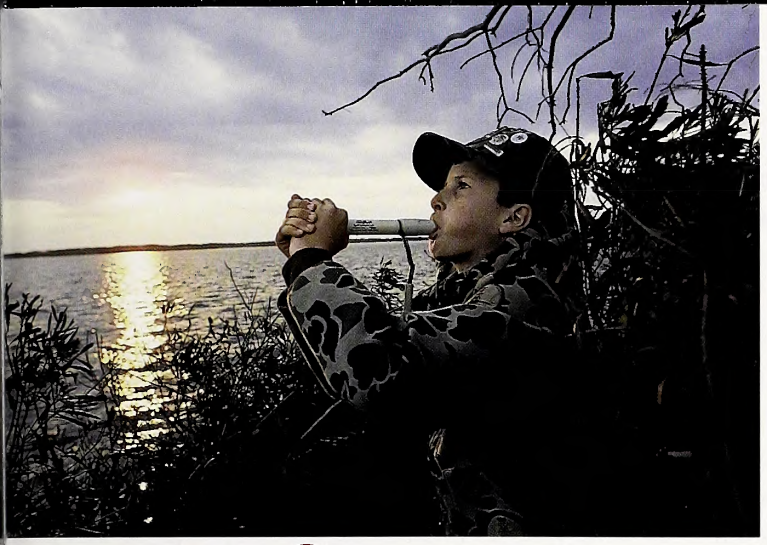
WILD TURKEY

These are the premier permit-only hunts, based on the number of past applicants. But that doesn't mean you won't get drawn. To up your odds, avoid choosing the opening weekend as your first choice.

SPECIAL PERMIT TURKEY HUNTS (15 areas across the state). Item No. 550. Overall Odds: 85 percent, except 57 percent on Roanoke River tracts. Deadline: March 1, 2002. Lowdown: Permit-only turkey hunting is offered on a variety of tracts, many of which have already been discussed. For safety reasons and to ensure a high-quality hunt, the number of permits issued for each tract is fairly low and is based on land area.

Insider Tips: Consider applying for a tract other than one on the Roanoke River to improve your odds. If drawn, scout during the early part of the week prior to your hunt—there will be no legal hunting pressure during this time, so you should be able to pattern the birds. If drawn for the Roanoke River, study the river level before and during your hunt—the Roanoke can fluctuate widely during the spring.

SCOTTY LOVETT



YOUTH HUNTS

The future of hunting is in the hands of our youths, so the Wildlife Commission has fittingly provided some of the best permit opportunities for youths ages 12 through 15. Youth-only hunts are offered for deer, waterfowl and wild turkey. All youths must have successfully completed a hunter safety course and be accompanied by an adult during the hunt. Don't get any fancy ideas, Dad. Adults must be present but are not allowed to carry a gun on these permits.

GUIDED CURRITUCK YOUTH HUNTS (Currituck County). Item No. 536. Overall Odds: 40 percent. Deadline: Nov. 1. Lowdown: If you thought the Currituck waterfowl hunts already listed were a great opportunity, how does a guided duck hunting trip sound? This hunt, held on the Youth Waterfowl Hunting Day, includes the use of a boat, decoys and blind as well as the services of an experienced local hunting guide. Heck, a free meal is also thrown in for the evening before the hunt.

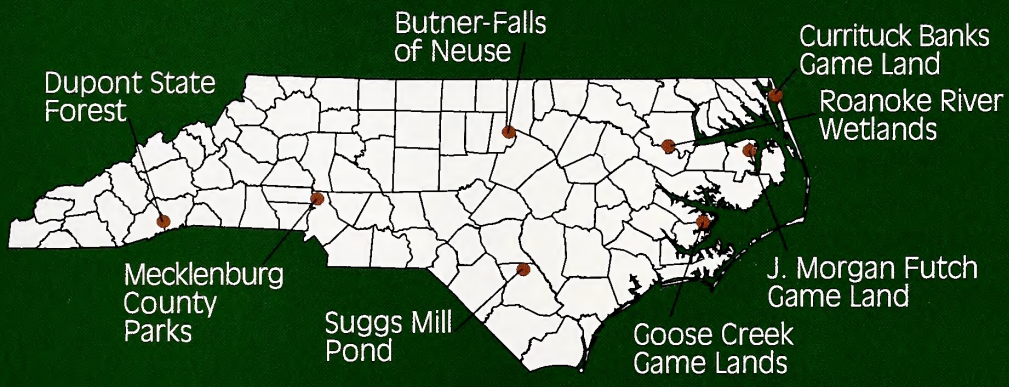
Insider Tips: Youths chosen for this hunt must attend a mandatory safety refresher the evening before the hunt. Those not present will be replaced during a standby drawing. Again, apply for a swan permit.

SPECIAL YOUTH TURKEY HUNTS (15 areas across the state). Item No. 553. Overall Odds: 99 percent. Deadline: March 1, 2002. Lowdown: These are permit-only hunts for youths held across the state on the opening day of turkey season.

Insider Tips: Opening Day and no adults are allowed to hunt on these tracts—sounds like a good bet for a youth to take his or her first tom.

FINDING YOUR WAY

Here are the general locations of the permit hunts mentioned. For more detailed information including maps of all the game lands, consult the current Game Lands Maps booklet. You can also find this information online at www.ncwildlife.org. Just click on the Hunting/Trapping link, and then go to Maps.



APPLYING FOR A PERMIT HUNT

This is as easy as falling off a log—well, not quite. But it's not as complicated as most people think. Most of the process is controlled by a computer, which randomly selects permit holders in a lottery fashion. All you have to do is follow these instructions.

- Appoint one person—you—as the chief of your party. The chief, that's you, will decide on the hunt dates and selection order using the ***Regulations Digest*** as a guide, then run them by your buddies.
- Now that you've picked your hunt choices on paper, take your digest and head to the nearest wildlife service agent. Be prepared to give your name, address, birth date, driver's license number and phone number.
- Give the clerk the item number for the hunt you wish to apply for and tell him or her you want to create a new party. Then give the clerk your hunt choices in order, most preferred first.
- Review your choices. If everything is fine, the only thing left to do is plop down 5 bucks for each item type you applied for ($10 for a swan permit). Be sure to keep your receipt.
- At the bottom of the receipt you will find a party ID number. Give this number and the item number for the hunt to your buddies. Now, they can go to a license agent and use these to join an existing party.
- Make sure you don't give the party ID number to more people than the maximum allowed for the hunt type, including yourself, or you will be disqualified during the computer drawing. You will also be disqualified if you apply for the same item number more than once.
- All that's left is to wait for the drawing. If you're not drawn, you'll receive nothing. If you make the list, a permit should arrive in the mail about 2 weeks after the application deadline. Sign your permit at once and don't forget to take it with you when you go hunting!

Lost Fish

Maybe it's not success that breeds obsession, but failure.

written by Jim Dean

illustrated by Chris Armstrong

What was this? Our friend was still on the small, rocky island where we'd left him an hour earlier, but he was lying down. Something was clearly wrong. It didn't cross our minds that he might be taking a nap. Surely he was sick or injured, dead even. Dead we might have understood.

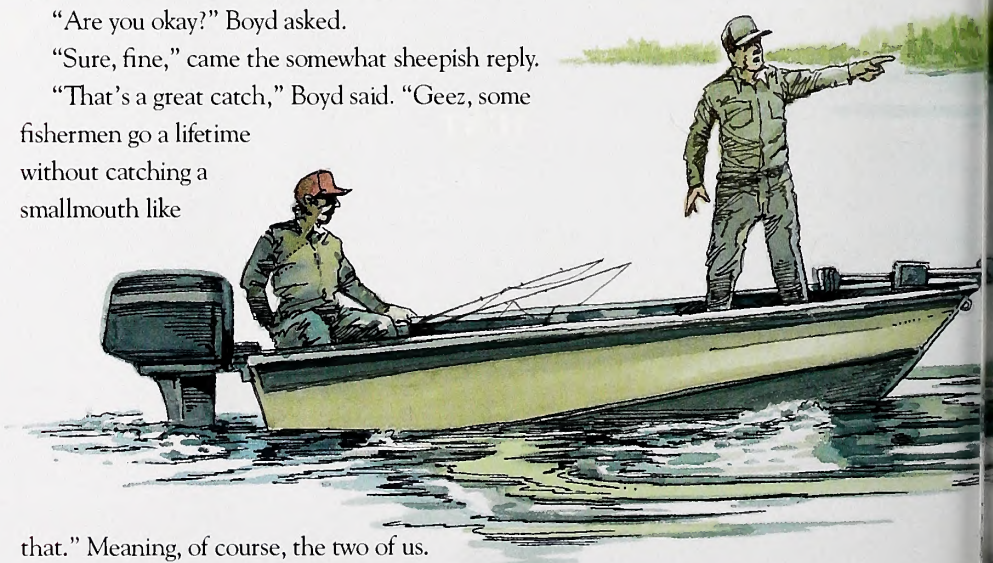
He stretched and yawned, then sat up when he heard the approaching outboard. We crunched the bow against the rock, and he helped us pull the boat up. Then, as though he suddenly remembered what this was all about, he stepped to the water's edge and hoisted his stringer for us to see. No longer were we puzzled—dumbstruck is more like it. How could anyone who had just caught a smallmouth bass weighing nearly 5 pounds lie down on solid granite and go to sleep?

That's more or less what my partner, Boyd, got around to asking him. After all, we'd given our novice friend a brief casting lesson and strategically stationed him on top of the best piece of bass structure in the lake—a massive pile of rock that had long ago sheared off the side of a cliff into deep water. If you approached quietly and kept the boat from banging on the rocks, you could fish from the top with a crankbait or jig and expect to nail at least half a dozen largemouths, with an occasional smallmouth as a bonus. Boyd and I had once caught 11 bass there. It was, we figured, the perfect place to initiate our friend into the sport we loved so well. It was also one heck of a piece of self-sacrifice.

"Are you okay?" Boyd asked.

"Sure, fine," came the somewhat sheepish reply.

"That's a great catch," Boyd said. "Geez, some fishermen go a lifetime without catching a smallmouth like that." Meaning, of course, the two of us.



"Yeah, I thought it might be a big one," he said, looking down at the stringer.

"Did they stop biting or something?" I asked.

"I don't know. I caught this one right away, but I was tired, you know, since we got up so early."

"Umm," was all Boyd could say. He looked like a Russian czar who had just seen one of his priceless Fabergé eggs hatch.

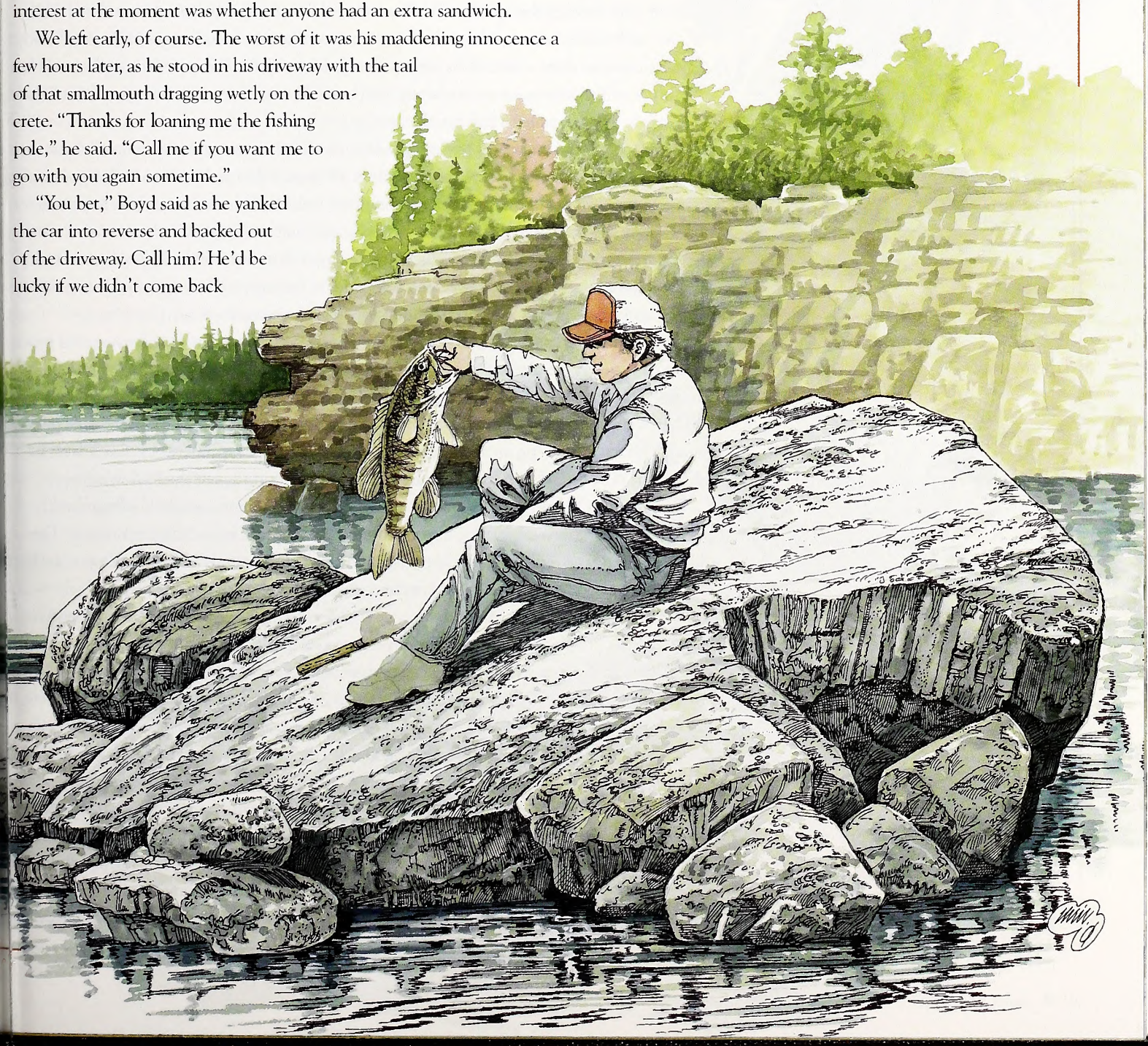
"Maybe you ought to put it back," I said hopefully. "It's still pretty lively."

"I'd kinda like to take it home to eat," he said. "Why don't you see if you can catch one?"

While our bored companion sat on a rock at 7:30 in the morning and ate his lunch, we caught four bass. The biggest might have gone 12 inches. Meanwhile, the smallmouth of our dreams was finning on the stringer, subdued by someone whose greatest interest at the moment was whether anyone had an extra sandwich.

We left early, of course. The worst of it was his maddening innocence a few hours later, as he stood in his driveway with the tail of that smallmouth dragging wetly on the concrete. "Thanks for loaning me the fishing pole," he said. "Call me if you want me to go with you again sometime."

"You bet," Boyd said as he yanked the car into reverse and backed out of the driveway. Call him? He'd be lucky if we didn't come back



after dark and roll his garbage cans to see if he'd even bothered to clean that fish.

Even now, more than 30 years later, I still think about that day on a Pennsylvania lake occasionally, and I now think I know what went wrong. Boyd and I not only didn't understand the nature of our own obsession; we had no inkling how best to transfer it to others. Despite our good intentions, we had put our friend into position for the worst possible thing to happen to him. He had caught a whopper on his first cast.

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When I bought a house some years ago, it took two large U-Haul truckloads, three friends and a case of beer to get me moved. Had I not been a fisherman, I probably could have handled the job myself with a pickup truck.

"Gees whiz, how did you accumulate so much, uh, stuff?" one of my helpers asked as he tried to maneuver a bristling armload of rods into the basement. Through the long, warm afternoon, what began as lighthearted camaraderie took on an increasingly biting edge. The basement, the den and a spare bedroom slowly filled with tackle boxes, reels, waders, nets, outboard motors, paddles, plastic bags of moldy animal skins and feathers, fly lines wrapped around coffee cans and cardboard boxes filled with great wads of entangled lures. The endless procession to and from the truck assumed a nightmarish quality.

Even I had never realized just how much fishing gear I'd accumulated. Here, it suddenly seemed, were the artifacts of a misspent life, proof of unfulfilled potential and willfully abandoned opportunity. That evening, I cleared off a chair and sat in the gathering gloom, too weary to find a light bulb and screw it into a socket. I shut my eyes and thought of the day, the very day, that my interest in fishing had taken its quantum leap. It would have been sometime in the early 1950s, and I could almost feel the sticky heat of that Sunday afternoon so long ago in eastern North Carolina.

I would have been about 10 years old, waiting barefoot in the yard in a sweaty swarm of gnats, rubbing my toes in the dirt and piddling with my spinning outfit and a small, metal tackle box. The smell of fried chicken would have been hanging over the neighborhood as folks sat on front porches, the men still in their white go-to-meeting shirts, the women wearing aprons. I could visualize Grandpa cruising up to get me in his cigar-ruined, bird-speckled blue Buick with its permanent store of tackle in the trunk and the cane poles sticking out the back window.

"Then, the bead chain on the swivel broke, and the bass slowly drifted down until my new silver Nip-I-Diddee was just a glimmer."

That summer, he and I had spent a lot of time fishing together in an old blackwater millpond. I had caught several yearling largemouths on my new rod, but nothing of any size. The old pond was not an especially productive spot, and my interest in fishing was not yet notably greater than any other boy's. It was something to do.

"Here, I bought you this," Grandpa said, handing me a new, silver-colored South Bend Nip-I-Diddee. I twirled the wooden lure's metal propellers and put it in my box. At the pond, I bailed out the boat with a tin can, and we finished loading it with paddles, a cinder block anchor and cushions. Grandpa rigged up his Pflueger Supreme and split-cane casting rod. He didn't have many lures in his tackle box—an old Creek Chub darter, a couple of crippled minnows, an Oriental wiggler, a Heddon Vamp and a weedless silver spoon that he rigged with a trailing pork rind (when he could get the rusty top off the jar).

He sculled the boat backward with one hand, slowly propelling us past the old dam and up a wooded shoreline. From his vantage, Grandpa could easily make the first cast to any likely spot, but he always managed to be fumbling with something whenever we approached a place where we'd caught bass before. Or his lure would land in a bush or "accidentally" sail off to the left. (My own children were grown before I suspected this was intentional. Indeed, I learned

to master the same faked ineptitude and errant casts so that Scott and Susan would get to fish the best spots first.)

Through the long afternoon, Grandpa and I fished intently, listening to the rasp of blackbirds, the light slap of water on the side of the boat and the sweet whir of reels. Our favorite spot was a flooded stump garden near the head of the millpond, where the ancient stumps had sprouted brush and even small trees. I cast my Nip-I-Diddee between two of the stumps, a spot Grandpa pointed out. The strike came like a huge fist erupting from beneath, knocking the lure several feet to one side. Somehow, the bass missed getting hooked, but it came back for a second try, and the lure disappeared in a massive boil.

I did little more than hang on as Grandpa frantically paddled us toward open water. I don't recall much else except the way that monster largemouth looked when I finally got it beside the boat. It lay motionless, its huge head slightly out of the water. Then, the bead chain on the swivel broke, and the bass slowly drifted down until my new silver Nip-I-Diddee was just a glimmer.

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Yes, there was not much doubt why my new house held far more fishing tackle than furniture. Clearly, all that gear could be traced to an unselfish grandfather. And to that lost bass.

I have, of course, lost many other big fish since that day. There was a big-as-a-commode-lid bluegill that stripped the gears on my reel. There was that monstrous brown trout that appeared suddenly behind a 9-inch rainbow I was about to net and engulfed it as I watched in astonishment. And there was an enormous king mackerel that stalked my live bait off the end of an ocean pier and took 300 yards of line to Portugal. We all know of such fish. They drift on that aimless tide of half-dreams just before we fall asleep, or they appear unexpectedly in real time and are gone, imprinted at that stopped-time instant when the line is suddenly, sickeningly slack.

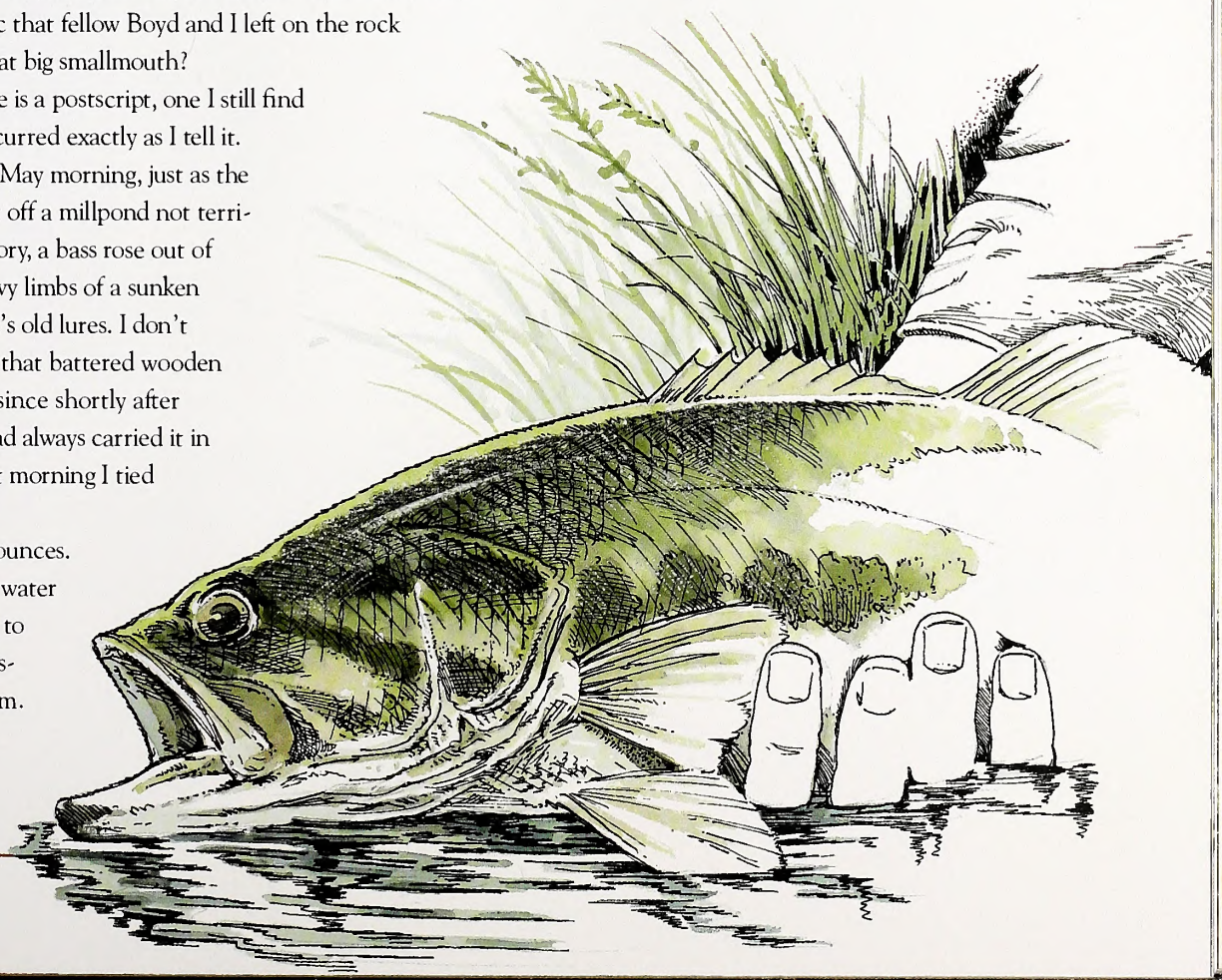
As for me, I look at failure quite differently nowadays, and certainly I consider myself fortunate, all those years ago, to have hooked a bass big enough to steal a lure. That fish left a gift, too. It is not, after all, success that breeds obsession, but failure. Who knows what sort of consecrated angling maniac that fellow Boyd and I left on the rock might have become had he lost that big smallmouth?

I could leave it at this, but there is a postscript, one I still find hard to believe, even though it occurred exactly as I tell it.

Several years ago at dawn on a May morning, just as the sun began to burn the golden mist off a millpond not terribly unlike another in distant memory, a bass rose out of 5 feet of water through the shadowy limbs of a sunken tree and engulfed one of Grandpa's old lures. I don't know why I happened to be using that battered wooden darter—I had not fished with it since shortly after Grandpa's death in 1968. But I had always carried it in my box for the memories, and that morning I tied it on the line.

The bass weighed 9 pounds, 8 ounces. For a long time, I cradled it in the water beside the boat, debating whether to keep it. But if you value your obsessions, you learn to take care of them. I relaxed my grip, and the biggest bass I'd ever landed gently slid from my hand. ⊠

"But if you value your obsessions, you learn to take care of them."



Sea Kayak Camping

written by T. Edward Nickens
photographed by Scott Taylor

Want to spend a few days—and nights—in the coastal wilds of North Carolina? Give sea kayak camping a try.

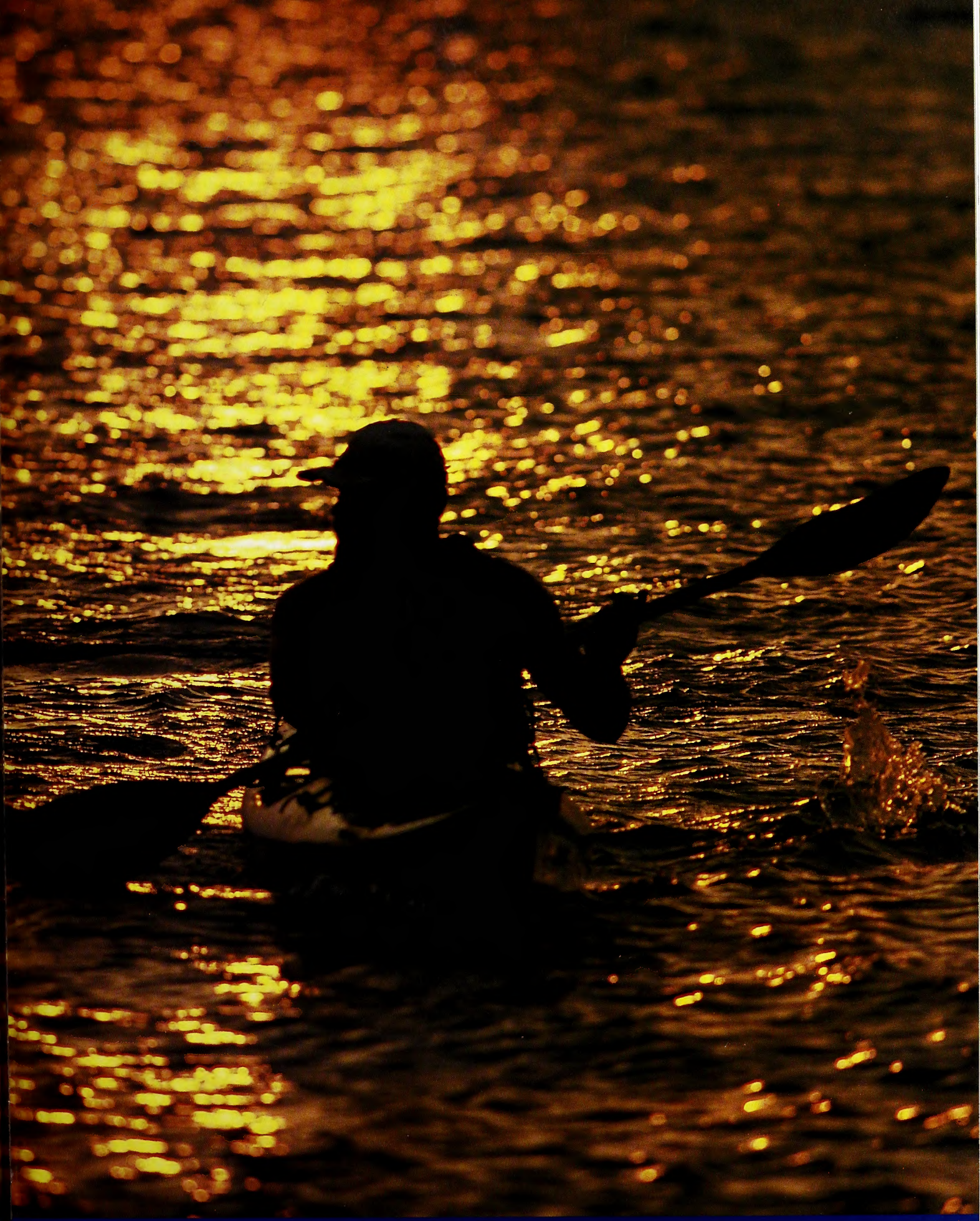
One of the most memorable campsites I've ever blundered onto was a little lump of high sand in a sea of Core Sound marsh. I had paddled down the sound all day, and it was the only patch of high ground for miles. It couldn't have been larger than a living room. I kicked a few square feet clear of a half-dozen spiders, flicked away hermit crabs skulking in flotsam and wedged a tent under a tangle of wax myrtle and greenbrier. But there was ample payback for this rough bivouac in the scrub.

Behind the marsh the occasional dune humped into view like the back of a breaching whale. Distant clumps of dark, green forest lay smokelike on a few scattered ridges. The tide ran out, exposing hundreds of acres of mud flat that shimmered in the warm light of a setting sun. My buddy Kevin and I huddled down in the marsh, backs to our kayaks, sipping coffee while royal terns, laughing gulls, dowitchers and a pair of oystercatchers—big, black-and-white birds with beaks the size of needle-nosed pliers—buzzed 10 feet overhead. Blue crabs scuttled at our feet. Our world was pared down to the maritime elements—sea and sky.

Just a little lump of sand. I couldn't find it again if I tried. But it remains one of my all-time favorite back-country overnighters.

You couldn't have walked there. You couldn't have biked there. You couldn't have taken a sailboat, johnboat or powerboat there. Tides and howling winds would have blown a canoe halfway to France. But we arrived by sea kayak, a craft that has opened up huge chunks of North Carolina to campers willing to learn how to pack and paddle these sleek vessels.

***Sea kayaks are** capable craft in both open water and shallow marshes. Their sleek design and light draft allow paddlers to reach remote coastal camping sites such as on Shackleford Banks (below).*



Sea kayaks are specialty craft, to be sure, but they specialize in traversing the kind of terrain that has long been very nearly off-limits to nonmotorized wilderness travelers. Sea kayaks cut through coastal winds and tides with remarkable ease. They open up vast stretches of river, marsh and sound-side beaches to camping. They are as quiet as a hunting osprey, making it easy to slip up on wading birds and wildlife. And—holy smokes—can they tote gear. A 17-foot kayak will carry at least as much camping gear as two backpacks. I've lashed fly rods and 10-foot surf rods to the decks. I've seen them carry crab pots, full-size woks, 50 pounds of camera gear and loaded coolers.

Of course, I've also seen them dump unprepared paddlers—and all their gear—into the surf. Sea kayak camping in North Carolina needn't be terribly difficult, but neither is it a paddle in the park. But anyone who can handle a canoe with reasonable skill, pack a backpack and swim well—because you never know—is a prime candidate for paddling a sea kayak and a couple of days' worth of victuals into some of the state's more inaccessible coastal wilds. You'll want to practice on a local lake or take a day-trip or two on calm waters. You'll need to plan your first few trips away from inlets and river mouths with strong tides and currents. And no one except an experienced paddler should attempt to negotiate open seas, with or without a loaded boat. Otherwise, the coast awaits—as do many Piedmont and mountain lakes.

KAYAK 101

If you're unfamiliar with the modern sea kayak, the best way to understand this distant kin of the Eskimo skin boat is to compare it to the white-water kayak, a craft familiar to most, if only through watching those boats squirt across the Nantahala River. A sea kayak capable of handling weekend-length camping trips is 15 to 18 feet long, perhaps twice the length of a river kayak. A sea kayak's very essence is to sustain speed and direction, so it tracks true as the tides and glides through water with an ease that eats up long distances. Paddle but 3 mph, and you can still cover 20 miles a day and more, depending on tides and paddling

skill. Drawing as little as 3 inches of water, sea kayaks are able craft in shallow coastal sounds.

Many people have paddled, or at least seen, sit-on-top kayaks, the open-hulled boats in which the paddler sits directly on top of the craft. Few sit-on-top kayaks are suitable for camping, however. Instead, kayak campers use touring boats, cylindrical craft in which the paddler sits inside a cockpit opening, with legs extended inside the boat. Each foot rests against a footpeg, which allows the paddler to brace for turns or balance in choppy water. A nylon or neoprene spray skirt fits around the paddler's waist and snugs down over the cockpit coaming to prevent waves from entering the boat. Beginning paddlers are most often concerned about getting trapped inside a sea kayak in the event that it capsizes, but the cockpits of most entry-level boats are large enough to make a quick wet-exit relatively easy. You simply reach forward to grasp the grab loop on the front of the spray skirt, jerk it clear of the cockpit coaming and wriggle free. (Now all you have to do is figure out which way is up.)

Paddling a touring sea kayak is the fun part. First-timers are amazed by how nimbly these boats move across the water. Forward motion is almost intuitive. Turning is a different matter. The longer the boat, the more difficult it is to turn. Turning well and quickly requires practice. Remember to lean in the direction of the turn. If you have the option, paddling a kayak with a rudder makes negotiating tides and wind significantly easier. Boats tend to turn and point into a wind, but with a rudder, manipulated by the footpegs, you can keep a sea kayak tracking true without wasting a lot of shoulder and arm energy correcting the boat's course.

If you're renting a sea kayak, chances are you'll have limited options when it comes to paddles, but it's always a good idea to ask. It's a paddling axiom that spending $50 more for a quality paddle will make more difference in paddling enjoyment than sinking $500 into a better boat. Most rental paddles are heavy, clunky affairs. Inquire about renting a lighter, more technically efficient blade. Or if you intend to rent boats a few times before purchasing your own, go ahead and buy a good paddle.

Kayak paddles come in a variety of configurations. The larger the actual blade surface, the farther each stroke will propel you, but the more difficult it will be to move the paddle through the water. It's largely a matter of personal preference and upper-body strength. Many paddlers prefer a feathered paddle, which means that the blades are attached to the paddle stem at an angle to each other. For example, if you were to hold a 90-degree feathered paddle in front of you, with the right-hand blade horizontal, the left-hand blade would be vertical. Paddling in stiff winds is much easier with feathered blades, as the blade not in the water offers little wind resistance during the power stroke.

You will find no shortage of highfalutin verbiage to describe the experience of sea kayaking, from "a religious chant, a prayer offered to the sea" (*Outside* magazine) to "ocean Zen" (Discovery Channel books). But don't let all that fool you. Paddling a sea kayak can be far less laborious than paddling a canoe. And with its rhythmic strokes and dolphin's-eye view of the world, sea kayaking can be a calming and peaceful way to get to wild country. But I've never mistaken it for a full-body massage. Paddling against strong tides will wring the life from your arms and back. Paddling a sea kayak against strong winds is far easier than doing the same in a canoe, but you will still have visions of an internal combustion engine dancing in your head. Tidal rips, river currents and sandbars will all conspire against you, so pick your destinations carefully, or go with a guide.

"Sea kayaking can be a calming and peaceful way to get to wild country."

Due to their size, *sea kayaks are able to haul a considerable amount of camping gear. With proper care in loading (facing page), these floating pack mules can carry tents, coolers, fishing gear and—oh yeah—people. The crafts also make excellent fishing boats, reaching spots other anglers can't get to.*

***The rewards of sea** kayak camping become clear come suppertime. With a little care in packing, you can bring along all the cooking gear you need to prepare a fine meal of fresh steamed clams and fried bluefish. A campfire after dinner serves as the icing for a day of paddling.*

HOME AWAY FROM HOME

Call me a slob, but one of the reasons I've enjoyed camping from a sea kayak is that the boats will carry so much gear. The trick is using every square inch wisely, and using every square inch. These touring boats are outfitted with waterproof hatches in front of and behind the cockpit opening, and that's where the gear goes. You'll need to pack gear in waterproof "dry bags" and pack in smaller bundles. Heavy items such as fresh water, food and cooking equipment should be packed low and away from the ends. Keep loads centered. Take a critical look at the sea kayak and think of what will fit where. Slip a spare fuel bottle into the very nose of the boat, then place a stuff sack into the space behind it, stuffing a sleeping bag or tent into the sack so that it takes up every cubic inch of interior space. Tent poles can ride low in the keel, out of the way. Make sure to pack any items that you want easy access to—fishing gear, flashlights, spare film—in dry boxes directly under the hatch, so you won't have to unload half the boat to get to your flybox.

There's room behind the seat for another small drybag filled with snacks, sunscreen, camera and a spare hat. Tuck a paddling sponge behind the seat so you can mop up water that makes its way into the cockpit. Load extra water just behind the front seat, then pack the hatches with increasingly lighter materials as you move to the stern. It's worth buying a waterproof map pocket that fits across the foredeck hull (that's the part in front of the cockpit). I slip a water bottle and a squeeze bottle of honey under the bungee cords too. If you need to, it's easy to lash additional gear to the top of the craft. Light items such as sleeping pads and dry bags packed with clothing can go behind the cockpit, with fishing rods tucked under the bungees on the foredeck. But bear in mind that how seaworthy you will feel (and how cool you look) is an inverse function to how much junk you have jury-rigged to the top of the boat.

PADDLE PLACES

Now the really hard part—choosing where to go in North Carolina. Beginning paddlers should take several daytrips before attempting to paddle a gear-laden sea kayak along even quiet coastal waters. Mountain waters such as Jocassee, Fontana and Santeetlah lakes are perfect for beginners, and any Piedmont reservoir will do. But once you're ready for an overnighter, consider these options:

✳ Merchants Millpond State Park

No tides, no inlets, no oyster shells, but breathtaking scenery abounds. Sounds like a perfect place for beginning paddlers. The eponymous 760-acre millpond in Gates County near the Virginia border offers primitive paddle-in camping in a wilderness setting.

✳ Hammocks Beach State Park

Less than 4 miles long, Bear Island in Hammocks Beach State Park near Swansboro is tailor-made for novice kayak campers. Launching at the park office, you cross the Intracoastal Waterway and follow a 2-mile marked trail through gorgeous salt marsh, then use a tidal creek that flows along the length of the island. There are 15 primitive campsites on the island.

✳ Shackleford Banks

Part of the Cape Lookout National Seashore, Shackleford Banks is a 9-mile-long, uninhabited barrier island, and primitive camping is allowed anywhere on the island. It can be reached from a sandy launch at the national seashore headquarters on Harkers Island, from the beach at Fort Macon State Park or from the public boat ramp at Beaufort.

✳ Core Banks

The wildest stretch of beach in North Carolina, Core Banks comprises much of Cape Lookout National Seashore. Access to the cape itself and the southernmost reaches of Core Banks is from the national seashore headquarters launch on Harkers Island. Other access points are in mainland communities such as Davis and Atlantic, and they require crossing Core Sound. Camping is allowed anywhere, except within 100 feet of any structure, but vast stretches of the sound-side marsh afford only limited areas of high ground. ⊠

Choosing a Camping Kayak

Any first-time sea kayak buyer is guaranteed to be befuddled by all the choices, from surfing boats that don't look all that different from whitewater kayaks to massive double sea kayaks that top 20 feet. But the fact that you wish to paddle your craft loaded with camping gear helps winnow away many niche boats. Here's what to look for.

You'll want a touring kayak, which means you'll be paddling a boat with a small cockpit opening that will be covered by a spray skirt. That erases sit-on-top kayaks and the newer large cockpit designs touted as recreational kayaks. Price might well direct you to a particular hull material. The primary choices are plastic (the cheapest and heaviest) and fiberglass (much lighter and much more expensive). You'll need a boat long enough to afford some serious gear-carrying room; one of the nice things about sea kayak camping is that you carry enough equipment to be comfortable. Boats in the 17-foot range will have hatches fore and aft, with plenty of room for gear. If you're more familiar with canoes, paddling a 17-foot craft solo might seem a daunting task, but you'll be surprised at how small such a boat feels compared to the open sound or ocean.

One of the most important decisions to make is how the boat feels in terms of primary and secondary stability. The only way to tell is to put the boat in the water and paddle it. Campers should concentrate on a number of features. Hatch openings are a consideration. Some kayaks come with openings the size of a small plate, whereas others have gullets that will swallow small packs in a single gulp. If your camping equipment tends to be bulky, look for boats with generous hatch openings. You'll also want deck rigging fore and aft. There is a debate about the utility of rudders, but you won't hear many people who paddle ruddered craft debating too much. If you can afford it, buy a rudder. It adds about $200 to the cost, but in North Carolina's windy waters, it makes paddling in a breeze much, much easier.

Some models to consider:

Carolina by Perception. 14 feet, 7 inches; 56 pounds.

Inukshuk by Boreal Design. 17 feet; 63 pounds.

Sealution II by Wilderness Systems. 16 feet, 9 inches; 63 pounds.

Magellan by Dagger. 16½ feet; 61 pounds.

The Pipe Vine Connection

A story about twining vines, mountain childhood memories, flashing butterflies, purple caterpillars, folk medicine, bloodsucking gnats and one strange-looking flower.

written by Doug Elliott
illustrated by David Williams

"Is that some kind of weird cucumber?"

I asked, as I picked up the green cylindrical pod that was lying there in the autumn leaves. My old mountain buddy Theron and I were way back in a rich, high mountain cove.

"That's from a smoke vine," he said.

"A smoke vine?"

"Yeah, see them big ol' twisty vines growing up those trees there? Them's smoke vines."

Having been raised in these mountains, Theron knows practically every plant and animal found here. But it is sometimes a challenge for me, a naturalist with a lot of "book learning," to connect Theron's traditional names with those in the books. Later, when I got home and pored through my wildflower field guides, I could not find any listing for "smoke vine." It wasn't until the following spring, when I saw the vine's large, heart-shaped leaves and unique flowers, that I was able to identify it. In the wildflower books, this vine is known as the Dutchman's-pipe vine (*Aristolochia macrophylla*). The flower has a crooked floral tube and a hollow, rounded bowl reminiscent of an old-time smoking pipe, hence the name.

I showed one of the pipe-shaped flowers to Theron and proudly explained how I had figured out that it was the flower's shape that earned it the name smoke vine.

"No, that's not why," he said. "Hit's cause you can smoke the vine."

"Smoke the vine?"

"Why shore," he said. "We used to smoke 'em when we's boys. You just cut up a piece of the vine about as big around as your finger, then you dry it out for a few days, and then you can just light it up and smoke it like a big ol' cigar. Hit don't taste too good, and hit's plenty hot, but we just did it to be adoin' something."

After I heard this, I dried out a few sections of the vine and was amazed to see how porous the stem was. It was a veritable bundle of hollow vessels. (And when well dried and ignited, it did smoke, like a hot, rank-tasting cigar.)

Of course, the porous structure of the Dutchman's-pipe vine is designed not so much to conduct mischievous mountain kids' smoke as to carry water and dissolved nutrients. These nutrients travel from the rich soil surrounding the vine's roots high into the treetops, sometimes 100 feet or more, to nourish the vine's lush foliage and delicate flowers. The graceful looping and twisting of these thick, old vines lends an almost tropical air to our temperate Appalachian "rain forests," as the plants climb from the shady depths of a deep cove high into the forest canopy.

Sometimes large, velvety black butterflies can be seen flashing metallic-blue hind wings as they fly around the vines' large, heart-shaped leaves. These butterflies are pipe-vine swallowtails (*Paplio philenor*). They are named for their relationship with the various pipe-vine species. Although the adults fly freely in the forest and into nearby meadows and gardens to sip nectar from a variety of flowers, they always return to the pipe vines to lay their eggs. Their larvae depend on pipe-vine leaves for food. The females deposit the eggs in clusters on the undersides of tender young leaves. When the tiny caterpillars first hatch, they often line up side by side in a group and feed communally for the first week or two. As they grow older and larger, they tend to spread out and go their separate ways.

I didn't know what I was seeing the first time I laid eyes on a large pipe-vine caterpillar. It looked like a weird, purplish sea slug with rubbery tentacles sticking out on all sides and two rows of yellow orange spots running down its back. It was calmly munching its way into a large, tender Dutchman's-pipe leaf. When I poked it, a pair of slimy yellow horns oozed out from behind its head, and I noticed a strange, bitter odor. In a few seconds the horns were pulled back into the head and disappeared. These horns are actually a gland called an osmaterium, and the odor serves as a repellent to parasitic wasps and other predators.

The caterpillars shed their outer skin several times as they grow. When a caterpillar is ready to pupate, it usually crawls some distance onto a tree trunk or branch. There it spins a silken pad for its hind end (the cremaster) and a silken sling around its middle, and it sheds its skin for the last time as a larva and becomes a grayish tan speckled chrysalis (or pupa). When the pupation is complete, the chrysalis splits along the back, and a soft, soggy adult butterfly emerges. Within an hour or two, its wings expand and harden. It then flies off in search of nectar and a mate. Depending on the climate, there may be several generations a year, and in subtropical areas the butterflies sometimes overwinter as adults.

The adult swallowtails are reported to have a pungent, penetrating odor and disagreeable taste that is believed to come from chemical compounds in the pipe vine. This is similar to the monarch butterflies, which derive their protective chemistry from compounds in the milkweeds that their larvae feed upon.

The graceful looping and twisting of these thick, old vines lends an almost tropical air to our temperate Appalachian "rain forests," as the plants climb from the shady depths of a deep cove high into the forest canopy.

It is believed that, in much the same way that the viceroy butterfly may have evolved as a mimic of the monarch, the spicebush swallowtail and the dark phase of the tiger swallowtail (which are both the same size as the pipe-vine swallowtail, with dark forewings and blue on their hind wings) may have evolved as mimics of the pipe-vine swallowtail. They all may gain a survival advantage by resembling their foul-tasting cousins.

Dutchman's-pipe is in the Aristolochiaceae, or birthwort family. Members of this group of plants occur in a variety of habitats, from northern forests to deserts and jungles, around the world. Wild ginger (*Asarum*), the heartleafs (*Hexastylis*) and Virginia snakeroot (*Aristolochia serpentaria*) are other North Carolina members of this family.

According to the Doctrine of Signatures, an ancient system of knowing plants, it was believed that every herb contained a sign or "signature," that gave a clue to its use. The curved, bulbous shape of the *Aristolochia* flower reminded the ancients of a fetus, hence the name birthwort and the use of some species as aids to childbirth. The name *Aristolochia* comes from the Greek *aristos* (best) and *lochia* (delivery), from the plant's supposed value in childbirth.

At least one member of the genus is used in other ways. One time I was staying with a Mexican family in a village tucked in among the foothills of the Sierra Madre when I found myself ailing with a case of dysentery. Once my hosts learned of my condition, one of the youngsters was dispatched into the dry scrub countryside to find *yerba del Indio* (herb of the Indians). Before long, he brought back a small, creeping vine with narrow, heart-shaped leaves and a familiar ruddy, purplish flower, much like our eastern species but with accentuated veins. It was none other than *Aristolochia watsonii*, a dwarf desert species of *Aristolochia*. They brewed it up into a tea. I drank a large cupful, and by the next morning my symptoms were gone.

Once I went on a spring field trip in our mountains with Ruby Pharr's botany class from Western Piedmont Community College. We found a Dutchman's-pipe vine in full flower. Because some of the blossoms were within reach, we picked one and examined its swollen base and the narrow tube that opened with a fleshy, maroon-colored, flaring end.

"Why would a flower have such a weird shape and strange color?" one student asked.

"Must have something to do with the pollination," we answered.

With that in mind, I conducted a "field dissection" and rather unceremoniously tore open the delicate bloom. As soon as the flower was opened, a small swarm of gnats flew out. This left us completely slack-jawed.

"What were those gnats doing in that flower?" we wondered.

They turned out to be the widespread bloodsucking gnats called no-see-ums, punkies or sand fleas. Because the larvae of these insects are somewhat

aquatic, the adults are usually found within flying distance of water. At certain times of the year, the bloodthirsty nature of the adults can make sitting by a quiet shore at twilight a tormenting experience as they swarm and bite exposed skin.

These ceratopogonids also feed on the blood of smaller mammals such as mice, wood rats and rabbits. One species has actually been collected on a number of occasions from the ears of jackrabbits. Ears of rabbits and other desert mammals are highly engorged with blood vessels, which are part of the animals' thermoregulation systems. These blood vessels near the skin help the animals radiate body heat and keep cool. The density of the blood vessels and their proximity to the surface of the skin make these kinds of mammal ears an ideal target for bloodthirsty gnats.

Researchers claim that the southwestern pipe-vine flower, with its musty odor, its many veins and its fleshy pink-and-brown coloration, resembles nothing more than a blood-engorged mammalian ear!

According to University of Arizona researchers Frank and Carol Crosswhite, "When a ceratopogonid lands on the inner surface of the flower, it is greatly surprised. Rather than finding an animal epidermis, which can be held onto firmly, a smooth and slippery, specialized surface is encountered. Landing on this surface causes the fly to slip and fall down into the 'pipe' of the flower."

In passing down the flower tube, the fly brushes against downward pointing hairs, which are no impediment to reaching the chamber at the base of the flower but do prevent the insect from escaping. The genus *Aristolochia* exhibits protogyny—the stigmas mature two or three days before the anthers, making the flower first functionally female and then functionally male. It is during the female stage that the flower acts as a trap. In a flower's female stage, the ceratopogonids repeatedly crawl over the stigmas during their captivity. After two or three days, the anthers split open, and the flower becomes a male. Once the gnats are covered with fine-grained pollen, the downward-pointing hairs on the inner surface of the flower tube wilt with a dramatic change in the water potential of the tissue, allowing the flies to escape with their load of pollen. If all goes well for the plants, those pollen-dusted gnats will soon fall for the same "fake-ear" trick played by similar flowers on different plants and tumble right down their respective tubes into the waiting ripe stigmas of the new flowers.

In this way, a population of pipe vines can achieve a healthy cross-pollination. Like pawns in a cosmic floral conspiracy, the hapless, instinct-bound gnats bumble from one fleshy blossom to another and may never find real ears with real blood to suck. I would almost feel sorry for them, if it weren't for the memory of too many nights spent in a leaky tent tortured by thousands of considerably more successful ceratopogonid bloodsuckers.

"I wonder what our eastern pipe vines imitate?" Ruby Pharr asked in a note. "Could it be a small animal's eye?"

The next spring found me roaming the hills and "hollers" pondering this question. I climbed trees and literally swung from vines trying to look these strange flowers "in the eye."

I found a lot of variation. Some of the Dutchman's-pipe flowers I examined had a yellow ring around the entrance of the floral tube, and they did look like an animal's iris. Others, however, lacked this bright ring; and some were a regal maroon in color, but others were greenish, pinkish or even a purplish-brown.

I collected some of the flowers. Before I disturbed each blossom, I quickly blocked the opening of the floral tube with my finger. Then I picked the flower, slipped it into a plastic bag and somewhat hardheartedly popped the entire bag into a freezer. Sometime later, I carefully opened each of the frozen flowers and shook out the gnats. By the end of the season, I had more than 100. Because gnat identification was a bit beyond the scope of my field guides, I packed my entire collection into a test tube and sent it to David Stephan at North Carolina State University's insect lab for analysis.

In spite of my clumsiness, Stephan was able to figure out the families to which they belonged. There was indeed one of those bloodsucking ceratopogonid gnats (like the no-see-ums that get trapped by desert pipe-vine flowers), but what was most surprising were the numerous kinds of gnats. There were fungus gnats and eye gnats, gnats that are attracted to carrion and dung, and even dog gnats. Altogether there were five families and seven genera represented.

The great variation in the appearance of the Dutchman's-pipe flowers may be a "shotgun approach" to attract this many different kinds of gnats. This may reflect the biodiversity of our southern mountains: the desert pipe vine has one kind of pollinator, but our eastern species has five or more.

The pipe-vine connection is a multi-faceted and widespread network, bringing together elegant iridescent butterflies, surreal purple caterpillars, swarming gnats, ancient folk medicine and memories of a mountain childhood. ⊠

It looked like a weird, purplish sea slug with rubbery tentacles sticking out on all sides and two rows of yellow orange spots running down its back.

Doug Elliott is a naturalist and a storyteller who lives in Union Mills, N.C.

BENEFICIAL BEAVERS

written and photographed by F. Eugene Hester

There's no doubt that beavers can cause problems for humans. But these natural engineers provide many benefits to the environment as well.

Beavers, more than any other wild animals, are able to remake their environment to meet their needs. With chisel-like teeth to cut down trees and an ability to build simple dams of sticks and mud, they create ponds that provide them a better place to live. Their alterations also benefit numerous other plants and animals—frogs, turtles, ducks and herons, to name a few.

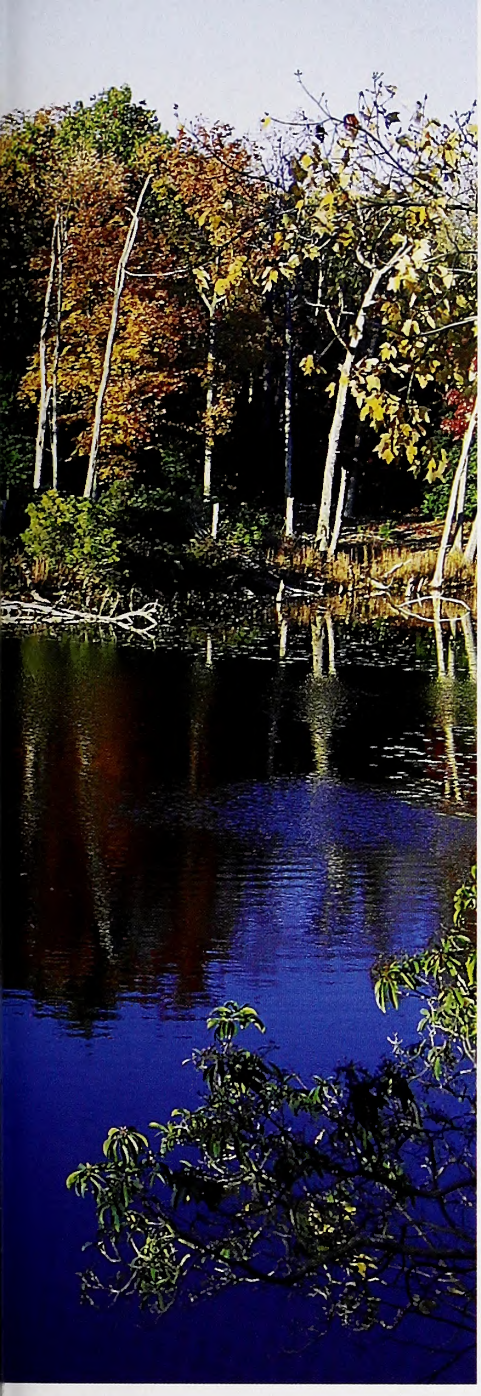
A pond is a different habitat from the stream above and below it. As beavers remove trees, they open an area to sunlight, allowing different plant and animal species to thrive. This flood of sunlight and the newly flooded wetlands create habitat diversity. The species that probably benefits most is the wood duck. Beaver ponds are ideal habitat for feeding, nesting, roosting and brood-rearing. The beaver may well be the best friend wood ducks ever had, creating valuable habitat and brooding areas.

***The resurgence of** wood ducks in North Carolina is due largely to the comeback of the beaver. When beavers dam creeks and streams, trees die, creating swampy homes for wood ducks, which nest in tree cavities.*

"If I stand here long enough and am really still and quiet, I am likely to see a hen wood duck and her brood," said avid duck hunter Jerry Richardson.

Few people appreciate beavers more than duck hunters. Jerry has found several productive beaver ponds within 5 miles of his Wendell home. One afternoon we stood on a beaver dam on a small stream. The dam, only about 2 feet high, made a shallow swamp pond of more than 2 acres. Beavers know the right places to make a dam flood the most area.

"Here in the Piedmont, we would not get much duck hunting if the beavers did not provide the habitat ducks need," Jerry said. "Beavers create swamps where wood ducks can be right at home. Most of these beaver



Besides providing homes *for waterfowl, ponds (far left) and their associated wetlands created by beavers make excellent habitat for numerous species including bullfrogs and bitterns (below).*

ponds are easy to hunt because they are shallow. You don't even need a boat. Just hide behind big trees or bushes and wait for the ducks to fly by. I doubt I could create a better wood-duck habitat than beavers do, and beavers do it for free."

SELF-INTEREST

Foremost, though, beavers improve their own habitat. The deeper water that results makes swimming easier and allows beavers to dive to escape enemies. It also provides them easy access to food. When water lilies and other aquatic plants grow in a beaver pond, they become food for beavers. Mainly though, the animals eat tree bark, made more accessible by both the flooding of trees at the old shoreline and the nearness of those along the new shoreline. Flooding also lets beavers float trees and limbs for adding to their dam or lodge.

A lodge is a mound of sticks piled up and crisscrossed to provide a safe home for beavers. Mud and leaves help bind the sticks. Inside the lodge, beavers chew away portions of sticks to create a living space. Underwater tunnels provide access to the living area.

When beavers move into existing lakes or farm ponds, they sometimes make bank dens. These are made by burrowing into the banks through underwater tunnels that turn upward above the water level. At the end of the tunnel is a larger living area.

Beaver populations have undergone wide fluctuations over the years. Harvesting beavers for their fur was an important incentive for early exploration and human settlement in wilderness areas of the country. Beavers have been overharvested at times; during the 19th century, they became rare in North Carolina and elsewhere. In recent years they have made a strong comeback and are now plentiful in many areas of the state.

***Beavers can also** cause problems when they come into conflict with human activities. Their dams can back up streams, flooding fields and highways. And they are notorious for eating the bark from sweet gums and fruit trees planted near lakes.*

Too Successful?

Do beavers cause problems? You bet. Sometimes these are big problems.

One landowner showed me where beavers had come from a pond and into his yard, where they had gnawed down several of his prized dogwood trees. Overnight this colony of beavers had transformed from interesting wildlife to significant pests.

Beavers can cut down even large trees. They eat a great variety of barks, sometimes without cutting the trees down. Girdling—eating a circle of bark completely around the trunk—is as mortal to a tree as felling it. And by flooding species intolerant to permanent water, beavers kill a lot of trees that they do not consume.

Their damage can also extend to human food. One day I got a call from Cedric Todd, a farmer friend from Wendell. Beavers were destroying his crops, and he needed help.

Adjacent to one pond was a large area where soybean plants had been cut down and carried away by beavers. Each night they raided his field. At Cedric's second pond, a large section of his cornfield had been cut down and carried off. We walked along the edge of each pond and soon found obvious trails from the ponds to the fields.

Despite their destructive habits of flooding land—as well as girdling trees for food and materials to build their lodges (right)—beavers benefit the environment in many ways. When their dams are built, beaver ponds prevent nutrients and pollutants from washing downstream. Instead, the materials settle to the bottom of the pond where they are consumed by bacteria and aquatic plants.

In each pond, the beavers had made a trench in the mud near the shore.

We placed large traps in the water trenches to intercept beavers on the way to the field. Setting them in the water ensured that we would not catch unwanted animals.

Each morning Cedric checked his traps and reset them when necessary. "Within a few days, I had caught four beavers from one pond and three beavers from the other one," Cedric said. "Then the damage stopped. If more come, I now know how to solve my problem."

Beavers do sometimes cause problems for humans, but so do a lot of other species of wildlife. White-tailed deer, black bears, Canada geese, raccoons, crows, gray squirrels and many other wild animals sometimes do things inconsistent with the interests of landowners. But on balance, beavers are beneficial animals.

We humans benefit from beavers in several ways. Some of the larger beaver ponds provide good fishing, and they are important for flood control and sediment control by slowing storm runoff. Beavers may destroy trees on one landowner's property, but their dam protects another's from flooding downstream. Beavers might not be so important in flat coastal areas where there are already many swamps and marshes, but in the Piedmont beavers create some of our best wetlands.

And in view of the fact that so many wetland areas have been destroyed to allow all types of development, it is good to know that some wetlands are also being created. ⊠

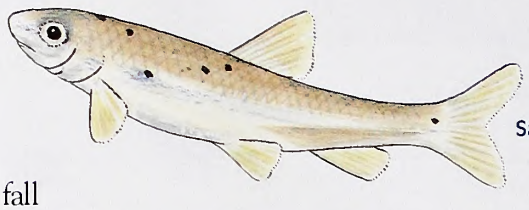
Retired wildlife biologist Eugene Hester has seen his share of beavers and their impacts while wading through North Carolina's swamps and creeks.

Take a look beneath the flowing waters of a sparkling stream. You just might see some

Mountain Minnows

written by Jeff Beane / illustrated by Consie Powell
nature activity by Anne M. Runyon

crescent shiner



Santee chub

WATER COLORS

Every autumn, people flock to the North Carolina mountains to see the trees in their fall colors. In late spring and summer every year, another spectacular seasonal color display occurs: Mountain streams come alive with the brilliant **nuptial** colors of minnows, darters and other fishes. Many fishes use color and pattern to recognize their own kind, and this is especially important when they are **spawning**. Some minnows—males especially—undergo dramatic changes during breeding season, developing **breeding tubercles** and bright red, yellow and blue colors rivaling those of coral reef fishes.

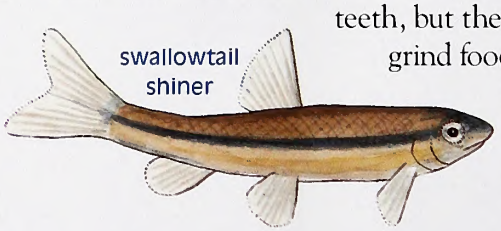
dusky shiner

WHAT IS A MINNOW?

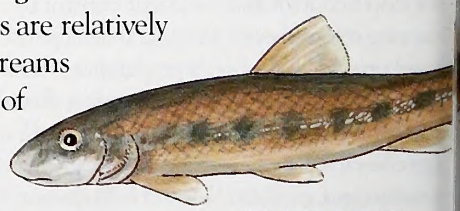
Many people use the term "minnow" to refer to any small fish, but to **ichthyologists**, minnows are a specific family of fishes—the family Cyprinidae. True minnows have **cycloid scales**, a single **dorsal fin**, **pelvic fins** that are situated behind (rather than immediately beneath or in front of) the **pectoral fins**, and usually a well-developed lateral line. Their mouths lack teeth, but they do have **pharyngeal teeth** that grind food. Most minnows are relatively small, like the streams where many of them live.

fatlips minnow

cutlips minnow

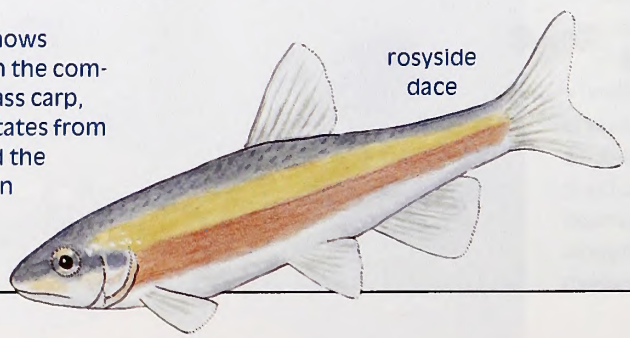


swallowtail shiner



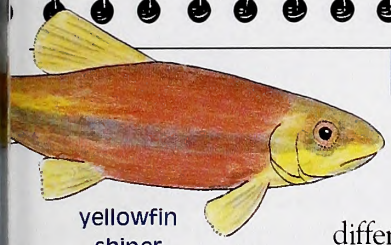
blotched chub

Not all minnows are small. Both the common carp and the grass carp, introduced to the United States from Asia, can weigh over 50 pounds, and the endangered Colorado squawfish can grow to 6 feet long and nearly 100 pounds.



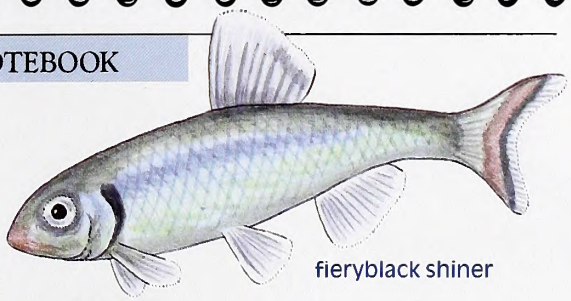
rosyside dace

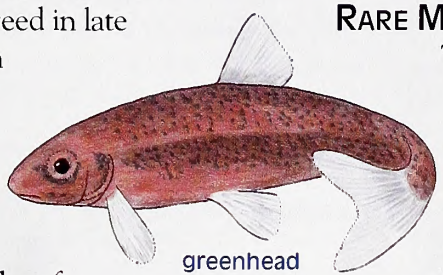
All the fish on these pages are shown at actual size.

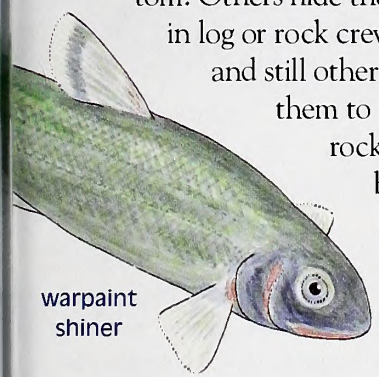

yellowfin shiner

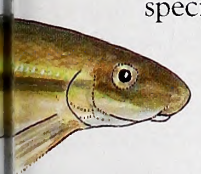
THE LIVES OF MINNOWS

Minnows occupy many different **niches**. Some eat other animals, some eat plants and some eat both. Some species live solitary lives, while others travel in schools. Most minnows breed in late spring and summer. Some spawn in open water and lay their eggs in the sand or mud on the bottom. Others hide their eggs in log or rock crevices, and still others attach them to the undersides of rocks or other objects. Some build gravel nests to protect their eggs, and many breed over the nests of other species. Some male minnows defend territories. Some smaller minnow species may only survive for two or three years, while larger species may live much longer.


fieryblack shiner


greenhead shiner


warpaint shiner



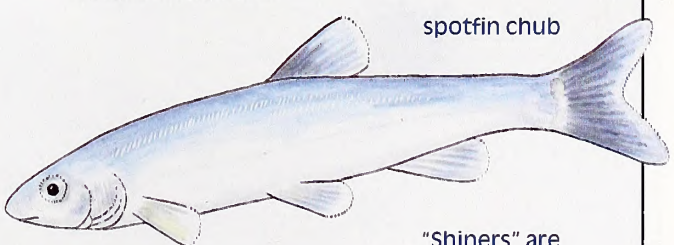
mountain redbelly dace

RARE MINNOWS

The minnow family includes some of our most common fishes, but not all minnows are common. Eleven species are listed as endangered, threatened or of special concern in North Carolina. Some, like the endangered Cape Fear shiner, are **endemic** to North Carolina. Others, like the cutlips minnow, barely enter our state. Many, like the spotfin chub, need clean, fast-flowing water and are threatened by pollution and habitat loss. Introduced, non-native fish species are another potential threat to many of our native minnows.

Cape Fear shiner

spotfin chub

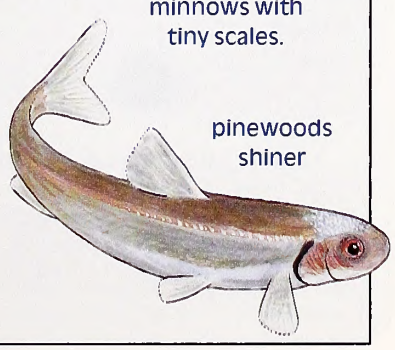


MINNOWS ARE IMPORTANT!

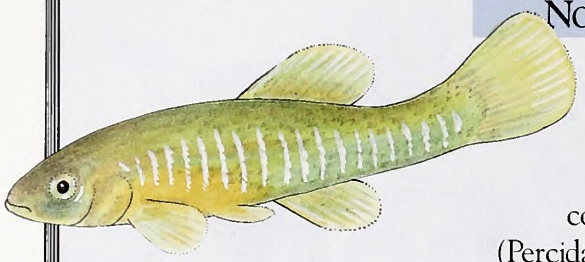
Minnows are often overlooked and underappreciated. Even fishermen often see them only as bait or as food for larger fishes. But minnows are much more important than that. They serve as predators and prey for countless other creatures and interact with all other living things in their aquatic environment. Some, like chubs, are **keystone species**, creating vital nesting sites for other fishes. Some play a crucial role in the life cycles of freshwater mussels. Many require clean water and serve as excellent indicators of environmental health. Minnows may seem small, but they play a gigantic role in freshwater ecosystems.

"Shiners" are minnows with shiny silver or gold scales. "Chubs" are minnows named for their rather thick, chubby bodies. "Dace" are usually brightly colored minnows with tiny scales.

satinfin shiner


pinewoods shiner

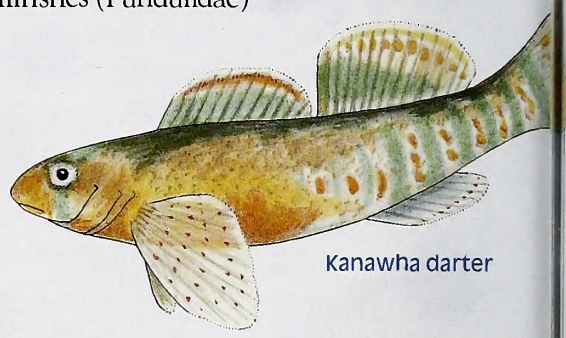
Though many minnows are found in mountain streams, you'll find species throughout the state.



banded killifish

Minnows That Aren't

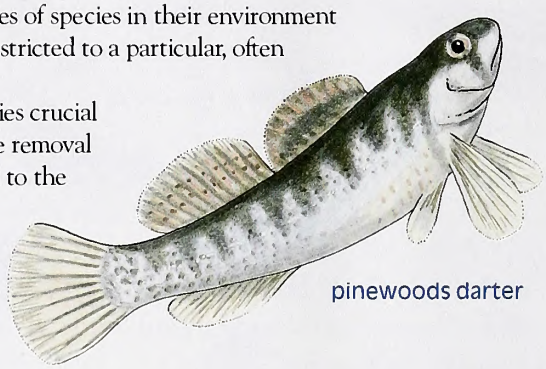
Not all small, colorful stream fishes are minnows. Darters are another large group of common and often beautifully colored stream-dwelling fishes. They belong to the perch family (Percidae). Among the many other fishes sometimes mistaken for minnows are certain suckers (Catostomidae), killifishes (Fundulidae) and the young of some sunfishes (Centrarchidae).



Kanawha darter

What Does It Mean?

nuptial: being in reproductive or breeding condition
spawning: breeding or reproducing; most often used in reference to animals that live in water
breeding tubercles: small, hard bumps or protuberances on a fish's head and body, usually developed by males during the breeding season
ichthyologists: scientists who study fishes
cycloid scales: smooth scales with no spines on the exposed surfaces
dorsal fin: the fin on a fish's back
pelvic fins: paired fins located on the underside of a fish's body
pectoral fins: paired fins located either high or low on a fish's side, near its head
lateral line: a line of pores along the sides of a fish's body containing sensory organs that can detect changes in water pressure
pharyngeal teeth: teeth on the last bony gill arch deep in the throat of some fishes
niches: the specific roles of species in their environment
endemic: native and restricted to a particular, often small, area
keystone species: species crucial to an ecosystem, the removal of which would lead to the disappearance of many other species



pinewoods darter

Get Outside

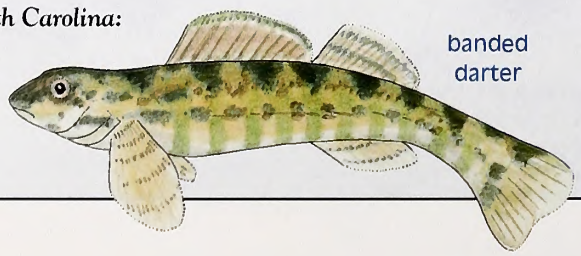
Go Fish-Watching: No matter where in North Carolina you live, you're probably close to a body of water that has minnows. Clear water and sunny days are best for viewing; and small, clear streams in the mountains and Piedmont provide some of the best minnow-watching opportunities. Watching fishes can be challenging. Get a good field guide and see how many species you can identify just by watching them. Study the range maps to see what species are in your area. A pair of binoculars will be useful, and polarized sunglasses can help you see into the water better by eliminating surface glare. Pay close attention to fish behavior. See if you can spot the piles of gravel or stones that chubs gather for their nests. If you're lucky enough to find an active chub nest, see if you can spot different kinds of minnows using it. Most minnows are difficult to tell apart and must be caught and closely examined to be certain of their identity. You can catch minnows with a dipnet or seine and temporarily place them in clear glass or plastic containers to see them more clearly. Some species make good aquarium pets. In some streams a permit is needed for collecting fishes, and some species are protected. Contact the N.C. Wildlife Resources Commission for information on regulations before you try collecting. Small fishes are delicate—always handle live ones carefully and with wet hands.

Read and Find Out

- *A Field Guide to Freshwater Fishes, North America North of Mexico* by Lawrence M. Page and Brooks M. Burr, Houghton Mifflin, 1991.
- *The Freshwater Fishes of North Carolina* by Edward F. Menhinick, North Carolina Wildlife Resources Commission, 1991.
- *Fish Watching* by C. Lavett Smith, Cornell University Press, 1994.
- *Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware* by Fred C. Rohde et al., The University of North Carolina Press, 1994.

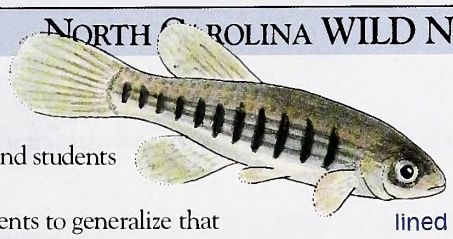
In *Wildlife in North Carolina:*

- "Fish That Build Gravel Nests" by Jeff Beane, October 1999.



banded darter

Editing and design by Consie Powell



lined topminnow

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Wildlife Is Everywhere!: teaches students to generalize that wildlife is present in areas all over the earth.

Fishy Who's Who: teaches students to recognize and identify species of fish that live in their area and locate places where the fish species occur.

Fashion A Fish: teaches students to classify fish according to body shape and coloration, and to understand how adaptations can help fish survive in their habitats.

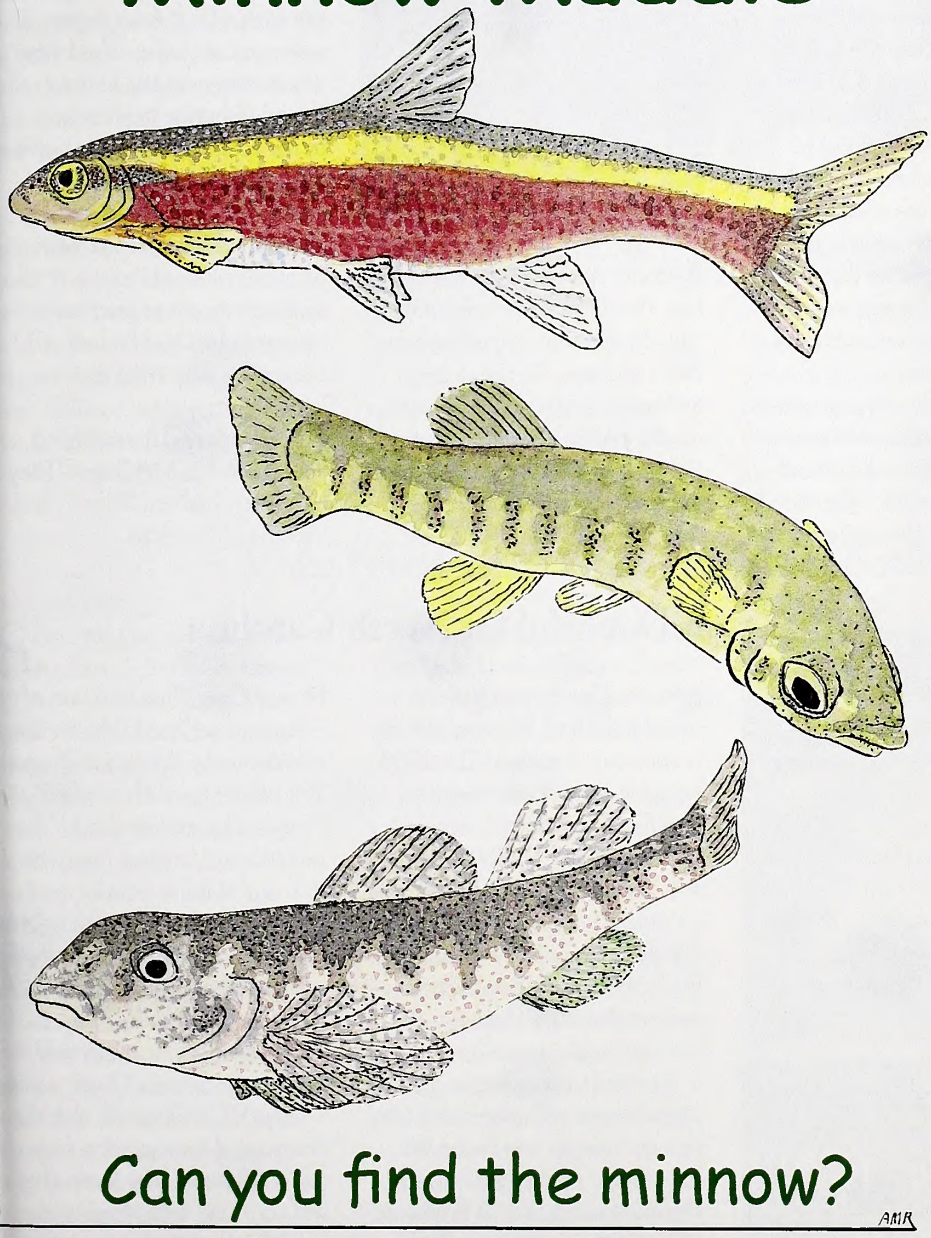
Get WILD

Advanced WILD Workshops:

Sept. 20-21 – *Living With Wildlife: Do We Have A Wildlife Problem?*, Crossnore, Avery County. Contact Anne Hice, (336) 674-6152.

Oct. 12-13 – *Piedmont Habitats*, Blue Jay Point County Park, Raleigh. Contact Blue Jay Point, (919) 870-4330.

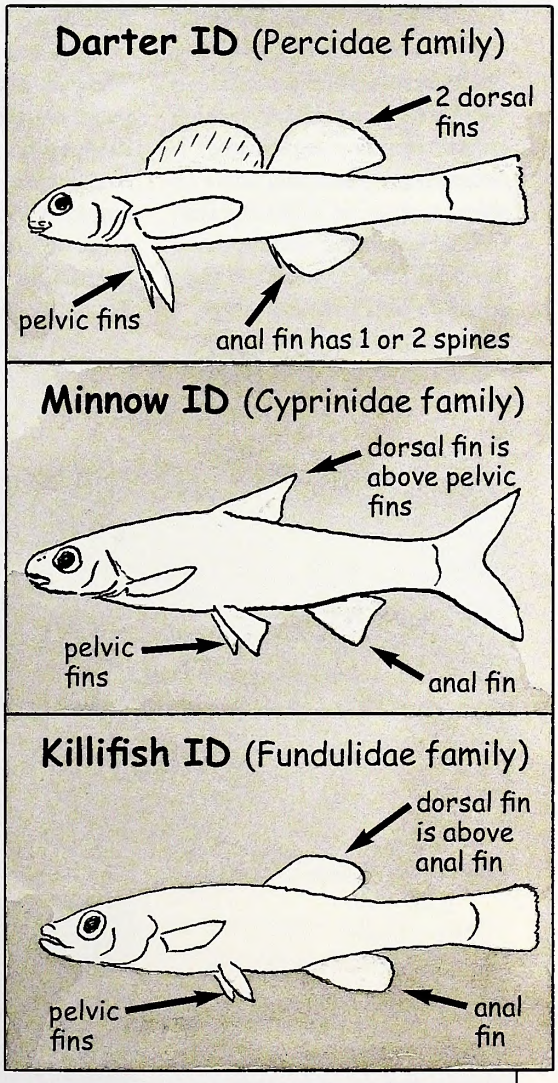
Minnow Muddle



Can you find the minnow?

AMR

Three pretty fish
slender and tiny,
swirl in the shallows,
their scales smooth and shiny.



Ginger Williams Takes the Helm of Conservation Education

A new leader promises new direction for the outreach and education arm of the N.C. Wildlife Resources Commission.

Ginger Williams, a 10-year veteran of the Wildlife Commission, has been promoted to chief of the Division of Conservation Education. She replaces Sid Baynes, who retired in May.

Richard Hamilton, chief deputy director of the commission, expressed confidence that the new chief "will provide the leadership and coordination necessary to attain the highest level of success for the Division of Conservation Education."

The education division coordinates the commission's outreach programs and workshops, such as N.C. WILD, N.C. CATCH and Becoming an Outdoors Woman. The division also publishes *Wildlife in North Carolina* magazine and operates the Pisgah Center for Wildlife Education, near Brevard.

***As the new chief** of the Division of Conservation Education, Ginger Williams promises a new direction for one of the more visible sections of the N.C. Wildlife Resources Commission.*

"We are able to provide a vehicle," Williams said, "that all divisions within the Wildlife Resources Commission can utilize to further educate the citizens of the state about important wildlife and fisheries projects and areas of concern. This will, in turn, enable the public to make better decisions based on their greater awareness of the environment and natural resources.

"I've actually seen our programs make a difference in the lives of the people who attend—kids and adults alike," she added.

That won't change under

JODY DUGGINS

Williams' direction, she said, but how the division goes about it will. To continue providing educational outreach, the division will begin relying more heavily on the wildlife education centers. Besides the Pisgah Center, two more are due to open in the next few years—on the Outer Banks and on the Centennial Campus of N.C. State University. These mountain, coastal and Piedmont centers eventually will become regional hubs for the commission's outreach and education programs.

Williams started with the commission in 1991, after graduating from Campbell University with a bachelor's degree in government studies. She began as a secretary in the Division of Inland Fisheries, moving over to the Conservation Education Division after a year to take a purchasing and budget position. She gained even greater administrative responsibilities over the years, earning a promotion to assistant chief and budget officer for the education division last August.

Williams and her husband, Tommy, live in Middlesex. They have two children, Tyler, 7, and Victoria, 20 months.

Edited by Brad Deen

Teal Season Doubtful for North Carolina

Waterfowl biologists with the N.C. Wildlife Resources Commission are almost certain that a September teal season will not be approved for North Carolina in 2001.

The U.S. Fish and Wildlife Service established the three-year, nine-day experimental teal season in 1998 to determine if green-winged or blue-winged teal could be hunted without other waterfowl being mistakenly shot out of season. The 2000 hunting season was the third and final year for the experimental season. The U.S. Fish and Wildlife Service would have considered making the teal season permanent in North Carolina, only if less than 10 percent of the ducks harvested were not teal.

KEN TAYLOR

However, according to actual observations of hunters, the 10-percent margin was exceeded during two of the three years. Dennis Luszcz, the Wildlife Commission's migratory bird coordinator, said the Atlantic Flyway Council, a coalition of eastern states, made the recommendation to the U.S. Fish and Wildlife Service that North Carolina be excluded from the teal season. At press time, the Fish and Wildlife Service had not made a final decision.

"Unfortunately, it was a fairly small number of people that were violators, but it didn't take too many violations to put us over the 10-percent margin," Luszcz said.

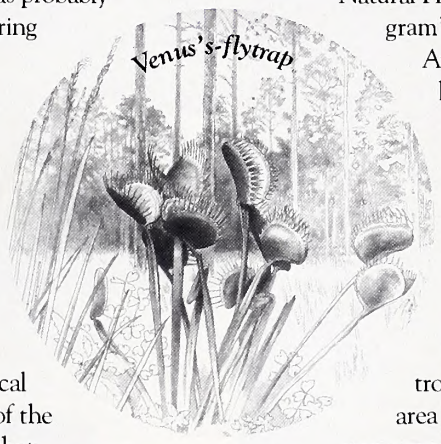
South Carolina was also recommended for exclusion from the teal season. The states that will continue with a teal season are: Maryland, Delaware, Virginia and Georgia.

Land Trust Kicks Off Campaign to Buy B.W. Wells Savanna

In 1920, B.W. Wells saw a 1,500-acre treeless savanna near Burgaw bursting with wildflowers virtually all year. Convinced there was no other place in North Carolina like it, the pioneer ecologist from N.C. State University and author of *The Natural Gardens of North Carolina* spent years studying the site and unsuccessfully campaigned for the state to acquire it as a preserve. Decades later, he was disheartened when the spot, called Big Savanna, was put into cultivation.

Big Savanna—or at least a part of it—may well rise again. This fall, the North Carolina Coastal Land Trust, working with the Conservation Trust of North Carolina, is launching a fund-raising drive to purchase a 117-acre remnant near Wallace, which it will name the B.W. Wells Savanna.

Richard LeBlond, a Natural Heritage Program botanist who discovered the site beneath a CP&L power line, said that it shares the same rare soil type as the Big Savanna and that the whole area was probably a lake bed during glacial times. The savanna has never been farmed and LeBlond said that CP&L mowing has maintained major ecological components of the original area that included the Big Savanna.



"The savanna remnant contains one of only four East Coast populations of the broad-winged sedge grasshopper, a globally rare grasshopper found historically at Big Savanna," LeBlond said. "In addition, the site has 170 native plant species, including six rare plants and 10 plants on the Natural Heritage Program's watch list. And my plant list is growing by the day."

It's likely to get even longer, ecologists say, when prescribed fire is reintroduced to the area as part of a management program. Grassy savannas are natural fire regimes and most savanna plants have an array of fire adaptations that enable them not just to tolerate fires but to prosper with them. Fire will open up some of the thick underbrush, and the sunlight is expected to cause long-dormant seeds to germinate, revealing even more flowering species, such as the Venus's-flytrap.

The campaign goal for the project is $110,000, according to Camilla Herlevich, director of the North Carolina Coastal Land Trust. "About 60 percent will go toward land acquisition, with most of the rest dedicated to the initial restoration work and an endowment for monitoring and management," she said.

The land trust believes the restoration of the savanna offers unique educational opportunities to the public to watch the savanna's transformation over time. And best of all, perhaps, it makes good on B.W. Wells' dream of a preserve for Big Savanna.

—Lawrence S. Earley

Wake Forest Class Goes Fishin' for Ecological Awareness

Some professors bend over backwards to teach. Daniel Johnson of Wake Forest University lies on his belly, pitched forward, his face so close to the lake's surface he could take a drink, in search of insect eggs or darting baitfish that will make a point. A student has to hold Johnson's ankles to prevent his headfirst slide down the sloping bank over slick leaves and rust-colored dirt.

Also in the name of education, he'll bait a hook, cast, then drift for hours in an open boat on a sunny spring morning, his students arrayed in boats around him.

Johnson, a biology professor, isn't taking a sabbatical, nor is he playing hooky with his class. They're in class, a freshman seminar titled Sport Fishing in America—or Fishing 101, as even Johnson occasionally calls it.

"At first I had a dirty look," said student Justin Kamlade of Charlotte, describing his parents' initial reaction when he told them he had signed up for a class on fishing. "After I explained it, they were OK."

The point of the class isn't to teach the finer points of fly-casting, although Johnson—an avid fisherman since childhood—will offer it for the asking.

"I use sport fishing as a hook—if you'll pardon the pun," he said, "to get them to start thinking about protecting our natural resources."

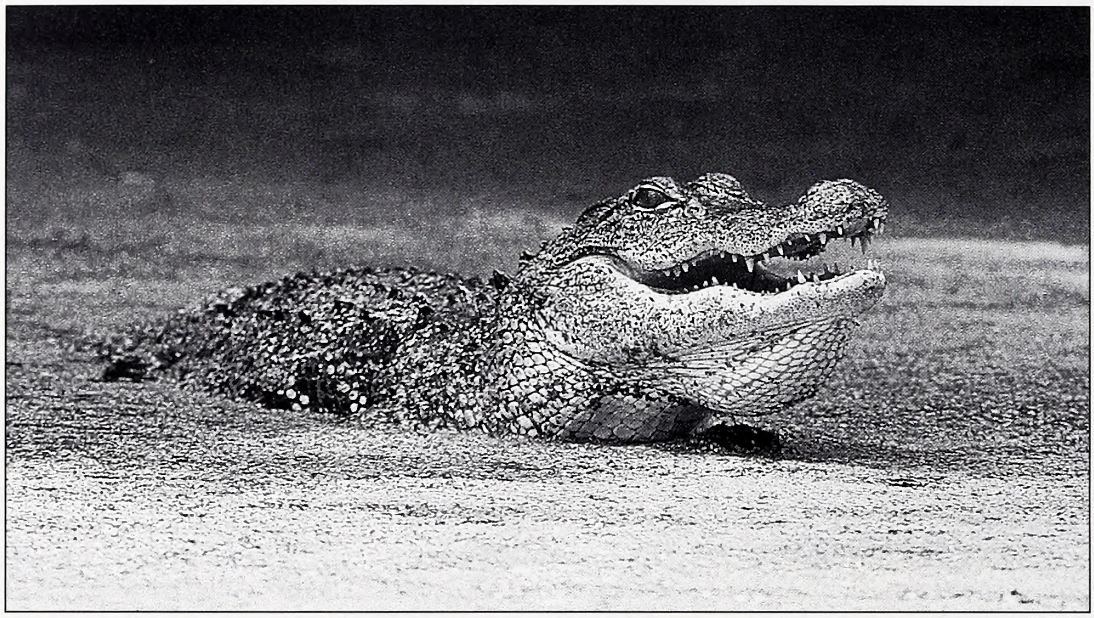
MELISSA McGAW

***Daniel Johnson, a biology professor** at Wake Forest University, demonstrates to three students how fishing interrelates with the natural world.*

Fish make a good barometer of the relative health of a waterway. "If you have fish, the water's probably healthy," Johnson said.

—Brad Deen

Feeding Leads to Alligator Attack on Onslow Fisherman



KEN TAYLOR

An American alligator, *similar to the one pictured, recently attacked a fisherman in Onslow County.*

Handouts to an alligator nearly cost a fisherman both arms.

The June 9 attack on the New River in Onslow County was the first instance of an alligator biting a human ever documented by the N.C. Wildlife Resources Commission.

A 34-year-old Jacksonville man and two companions—his brother and sister-in-law—tossed crab bait to the alligator, according to a report prepared by Wildlife Commission biologists. But the injured man's brother later denied feeding it, except to lure the marauder away.

According to the report, the trio was fishing at Town Point, a civilian-accessible portion of Marine Corps Base Camp Lejeune. The alligator—estimated at 10 to12 feet long—climbed onto the beach, and the trio threw it shrimp and fish morsels. Eating its apparent fill, the creature swam away.

A few hours later, the brothers waded waist-deep into the river to check their crab pots. The gator clamped onto the victim's right arm.

Pounded and dragged toward shore, the gator let go—only to grab the man's left arm, all but severing it below the elbow. The brothers pummeled the gator more, and the woman flogged it with a cane pole, before it gave up.

The injured man was airlifted to Duke University Medical Center, where he underwent surgeries on both arms, including reattachment of his left arm.

The rare attack came just three weeks after the Wildlife Commission captured an 8-foot alligator from a housing development lake in Alamance County. As is customary in such cases, state biologists relocated the creature to the Green Swamp in Brunswick County, one of the eastern counties in which the alligator is fairly common.

Carl Betsill, a Wildlife Commission biologist, said the agency has no intention of tracking the alligator that attacked the fisherman, unless it demonstrates a pattern of aggressiveness toward humans.

"We have investigated the site. We couldn't identify any particular alligator that shows any sign of approaching people, or being any sort of threat," he said.

The incident should serve as a reminder that feeding a wild animal causes it to lose its instinctive fear of humans, which can turn it into a nuisance or worse.

"They begin to associate food with human beings," Betsill said. "Alligators are not very intelligent creatures. That's the case with a lot of wildlife. You don't want them associating you with food. And the more intelligent wildlife, such as a raccoon, will start to demand you feed it. That causes problems too."

With the possible exception of birds and a backyard feeder, Betsill cautioned against feeding any wildlife. "These are not domestic animals. They don't need to be fed. While we may be tempted to feed them and help them, they really don't need our help. And if they do create problems for humans, they may end up being destroyed. So you're really not helping them at all."

—Brad Deen

On Patrol

Editor's note: *The situation described below exemplifies the always-unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

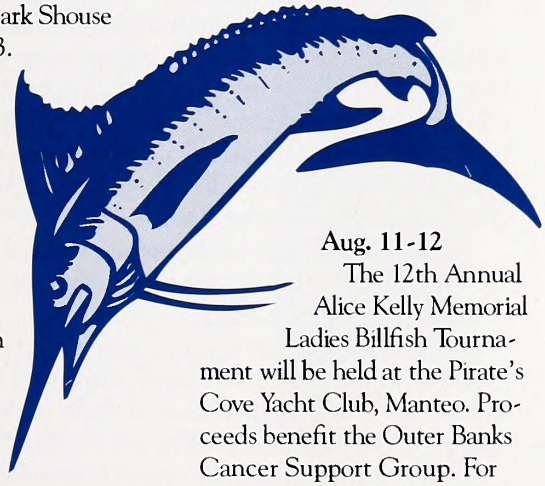
Charged with shooting a deer decoy from the road in Hertford County, the defendant told the judge that he couldn't turn over the weapon, as ordered, because he had lost it while floating a creek, squirrel hunting. Not one to be trifled with, the judge quickly resolved the problem when he ordered the man to purchase a new identical gun, then turn it over to the Hertford County Sheriff's Department. (Guess that makes two guns that went down the drain).

Outdoor Calendar of Events

On several occasions, events in this calendar have changed without notice. Readers should check with the contact listed before traveling to an event. Items should be conservation oriented and should be submitted at least four months in advance.

Aug. 2-4

N.C. Ducks Unlimited is sponsoring a tag-and-release billfish tournament to fund preservation projects for state wetlands. The tournament begins at Anchorage Marina, Atlantic Beach. For more information, call Mark Shouse at (252) 726-4423.



Aug. 4

Learn to identify late-summer wildflowers at the Pisgah Center for Wildlife Education, Pisgah Forest. The two-hour program (9-11 a.m.) for ages 16 and up will use *Newcombs Wildflower Guide*, available for purchase at the center. For more information, call (828) 877-4423, e-mail patterson.melinda@coned.wildlife.state.nc.us, or visit online at www.ncwildlife.org.

Aug. 4-5

The Seventh Annual Martin County United Way Invitational Two-Day Team Bass Fishing Tournament will be in Williamston. Entry fee is $100 per team. Ten places will be awarded. For more information, call (800) 776-8566, or e-mail tourism@visitmartincounty.com.

Aug. 11

Learn the basics of fly-fishing in a single morning from an experienced fly-fisherman and guide at the Pisgah Center for Wildlife Education, Pisgah Forest. This workshop is for ages 16 and up. Fee is $10, with equipment provided. For more information, call (828) 877-4423, e-mail patterson.melinda@coned.wildlife.state.nc.us, or visit online www.ncwildlife.org.

Aug. 11-12

The 12th Annual Alice Kelly Memorial Ladies Billfish Tournament will be held at the Pirate's Cove Yacht Club, Manteo. Proceeds benefit the Outer Banks Cancer Support Group. For more information, call (800) 422-3610, or visit online www.fishpiratescove.com.

Aug. 19

Nature journaling is the focus of this month's HOP-IN (Happening Outdoor Programs Involving Nature), for teens ages 14-18, at the Pisgah Center for Wildlife Education, Pisgah Forest. The two-hour program starts at 1 p.m. For more information call (828) 877-4423, e-mail patterson.melinda@coned.wildlife.state.nc.us, or visit online www.ncwildlife.org.

State Record for Freshwater Drum

Garret Freeman Jr. may be only 7, but already he's a record-breaking angler. The Rocky Mount youth landed a 3-pound freshwater drum, establishing a state record for the species. He was fishing on Roanoke Rapids Lake in Halifax County using a live minnow.

The drum measured 19 inches long and 13 inches in girth.

There was no old record to break—not officially, anyway. The state Wildlife Commission's Division of Inland Fisheries, which oversees the State Record Fish Program, previously had not recognized the freshwater drum. However, Bob Curry, a program manager with the Wildlife Commission, said the agency's Division of Inland Fisheries is starting to recognize nongame fish as well as game fish.

"We simply want to recognize more anglers and their accomplishments in fishing," Curry said.

Though native to this state, the freshwater drum population is relatively small and restricted to the French Broad River drainage. The fish caught in Roanoke Rapids Lake was likely released there, but not by the Wildlife Commission, Curry said. The freshwater drum's range extends from Canada to Central America, mostly occurring in the Mississippi drainage.

For a list of the 40 freshwater species that the agency recognizes, and the record sizes, call the Division of Inland Fisheries at (919) 733-3633, Ext. 281, or log on to www.ncwildlife.org. Click onto the Fishing link, and among the menu options will be state records and how to report a state record.

DONATED PHOTO

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through May 2001

Principal Balance
$32,394,812.73

Interest Earned
$33,517,817.09

Total Receipts
$65,912,629.82

Interest Used
$22,275,565.04

Fund Balance
$43,637,064.78

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax-deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Creating Natural Areas

by Chris Powell

The end of summer is approaching, and chances are you've had your fill of mowing the lawn for one season. A good way to reduce mowing time and benefit wildlife is to create natural areas in your yard. Mark off an oval-shaped area around groups of trees, then build the area up with soil and a top layer of mulch. Azaleas, dogwoods and other woodland plants can be planted in the natural area. For a little decoration, add a feeder or birdbath, and the spot will become a magnet for neighborhood wildlife.

Trees usually consume most of the nutrients and water around their bases, so your natural area may need a little help. Instead of throwing away grass clippings, try spreading them around the natural area. This mulch will hold in moisture and improve the soil. Also, you can chip tree limbs and apply leaves and pine needles directly as mulch. This is a great way to recycle natural debris.

With a little care and imagination, you can reduce your yard work while creating first-rate habitat for birds, squirrels and maybe even rabbits.

Eliminating Fescue: If you've considered reducing or eliminating fescue on your property to help wildlife, you're in luck. Fall is an excellent time to begin ridding areas of your property of tall fescue. The key to eradicating fescue is to attack the grass when it's actively growing. Cut your fescue back now through early October, and then allow it to regenerate before applying RoundUp, or a similar herbicide. You can burn off the residue in late winter, and then apply another herbicide treatment in spring if necessary.

Once you've eliminated the fescue, you'll want to plant native warm-season grasses such as bluestem and switchgrass on your land come spring. Contact your district wildlife biologist or call (919) 733-7291 for more information on converting to warm-season grasses.

Rabies Prevention: With the approach of hunting season, now is an excellent time to update rabies vaccinations for your dogs. Yearly vaccinations are not only the law, they also make excellent sense to protect you and your pets against this deadly disease. Because hunting dogs are especially likely to encounter rabid raccoons and foxes while afield, this is one reminder you shouldn't ignore.

N.C. WILD STORE

NEW!

SPORTING HERITAGE T-SHIRT

Our sporting heritage products have a purpose—to honor North Carolina's sporting traditions. What could be more treasured than the thrill of hooking a largemouth on the calm waters of an old millpond? This all-cotton tee spotlights bass-fishing traditions with a Duane Raver painting of a largemouth at Atkinson's Mill, where water-powered wheels have been grinding corn in Johnston County since 1757. The sporting heritage logo on the front complements the distinctive scene on the back. This T-shirt will give your friends and family members something worth remembering. Adult sizes, medium to XX-large.

$14.50

ITEM CODES:

A12MED (medium)
A12LRG (large)
A12XLRG (extra large)
A12XXL (extra extra large)

Left front design

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Salamanders of North Carolina

Explore the hidden world of some of North Carolina's most unique creatures. This poster both educates and captivates with color photographs of the 13 salamander species in North Carolina that have lungs or gills. Habitat and life cycle notes for each species accompany the illustrations (24" x 36").

$6 ITEM CODE **P19**

▲ Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

▶ Amphibians: Frogs of North Carolina Poster Set

Set of two posters in full color: The Hylid Frogs & True Frogs and Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom (22" x 34").

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set (**P17**). Guide also sold separately.

$2 ITEM CODE **M5**

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. (22" x 34")

$10 ITEM CODE **P18**

▲ Sporting Heritage Posters

These sporting heritage posters preserve two treasured traditions. Each poster is 22" x 34".

Traditional Trout Flies of the Southern Appalachians

Color illustrations of 16 trout flies accompany brief histories and detailed descriptions. $10 ITEM CODE **P13**

Waterfowl Decoys of North Carolina

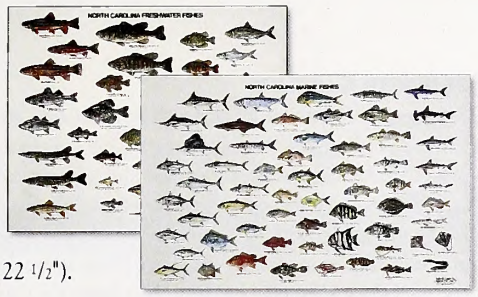
Descriptions of classic decoys made during the heyday of waterfowl hunting complement 19 color photographs. $10 ITEM CODE **P12**

Reptiles of North Carolina ▶

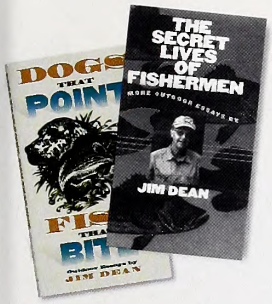
Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

$18 ITEM CODE **P10**

Fishes of North Carolina



Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").
$10 ITEM CODE P9



Dogs that Point, Fish that Bite

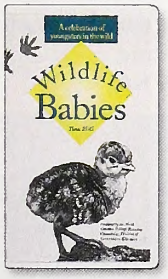
Sample 50 of Jim Dean's best essays for *Wildlife in North Carolina* magazine.
Hardbound $19.95 ITEM CODE M8
Paperback $10.95 ITEM CODE M12

The Secret Lives of Fishermen

More of Jim Dean's well-honed observations on hunting, fishing and the country life.
Hardbound $24.95 ITEM CODE M13

All Things Are Connected

Video and Activity Guide.
Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.
$22 ITEM CODE W3



Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.
$20 ITEM CODE N9

Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.
$2 ITEM CODE M6

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.
$10 ITEM CODE M2

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each
Cub & Boy Scout Correlation ITEM CODE E9
Girl Scout Correlation ITEM CODE E10

Pisgah Center for Wildlife Education T-shirt

100% cotton beige tee with colorful design on back (featured here) and Pisgah logo on front. Adult sizes.
$14.50 ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

Wee Tees

Just like the adult shirt, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50

Embroidered Caps

Wildlife in North Carolina Caps
Exclusive designs and magazine logo are featured on four different cap styles.
$16.50 each

A11

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE A11
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE A3
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE A7
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE A6

A3

A6

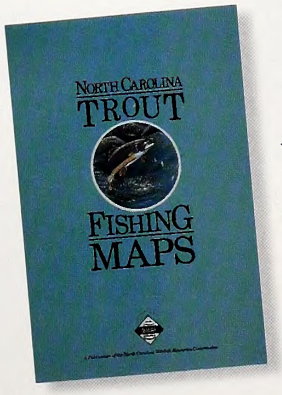
A7

A1

A10

N.C. WILD Caps. N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.
$16.50 each

- Tan cap with forest green bill. ITEM CODE A1
- Tan cap with burgundy bill. ITEM CODE A10



North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.
$12 ITEM CODE TMAP

◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

2000 Migratory Waterfowl Print ▶ and Stamp Set

This limited edition print signed by artist Ron Louque depicts the grace and color of canvasbacks in flight at North Carolina's historic Whalehead Club. Your purchase will support the Wildlife Commission's efforts to manage wetlands and restore waterfowl populations. Overall size is 12" x 14"; image size 6 1/2" x 9". ***This item is not subject to 15% discount.***

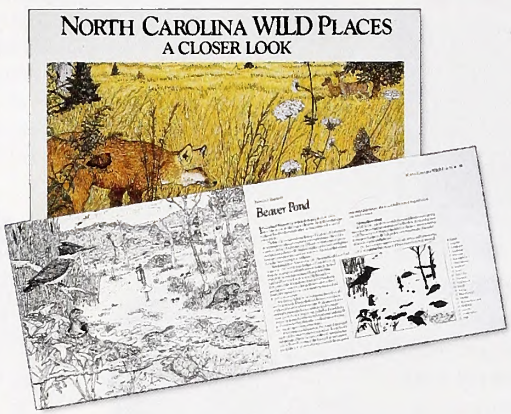
$145 ITEM CODE **DSP00**

North Carolina WILD Places: ▶ A Closer Look

Book and Posters Set.

Explore the diversity of the state's natural communities in an 82-page soft-cover book written by naturalists and journalists. This guide describes 13 habitats across the state with captivating illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a North Carolina WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

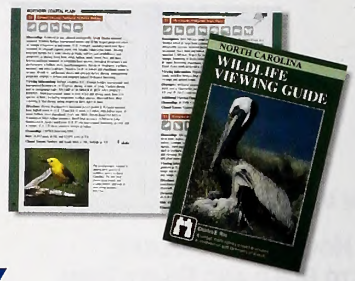
$16 ITEM CODE **E6**

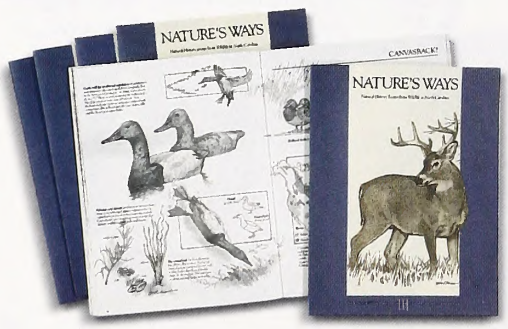


North Carolina Wildlife ▼ Viewing Guide

From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**





Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

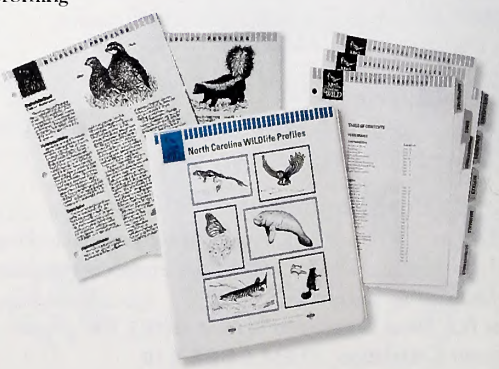
Unboxed set. $27.50 ITEM CODE **M9**

N.C. WILDLIFE Profiles Binder & N.C. WILDLIFE Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

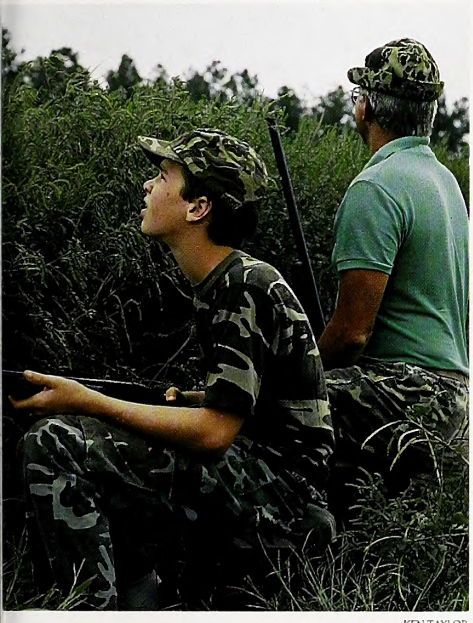
- 120 illustrated fact sheets, each profiling an animal's history, status, habitat, behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**



Hunting Safety: 101

WILDLIFE COMMISSION SPOTLIGHT



KEN TAYLOR

If a youth *has not completed a hunter education course, they must be accompanied by a licensed adult at least 21 years of age.*

Dove season is right around the corner, and there is no better time to introduce a youngster to the sport of hunting. A good field can produce exciting, fast-paced wingshooting that is almost guaranteed to hook a boy or girl for life.

Before a youngster can hunt, they must be at least 12 years old and have successfully completed a North Carolina Wildlife Resources Commission hunter education course, or they must be accompanied (close enough to take control of the hunting device) by a licensed adult at least 21 years of age. Scheduled throughout the year in every county, these classes are taught by wildlife enforcement officers and volunteer education instructors. The hunter education course includes information about hunter responsibility, wildlife conservation and firearms. The course also includes wildlife identification, survival and first aid, and specialty hunting as well as tree stand safety. The course is a minimum of 10 hours and is accepted in every state and province in North America.

Due to hunter education, hunting accidents have decreased more than 50 percent during the last 20 years, making hunting one of the safest recreational activities.

For more information on hunter safety classes, log on to www.ncwildlife.org or call (919) 733-7192.

MELISSA McGAW

Before a youngster *can hunt alone, they must first be at least 12 years of age and have successfully completed a hunter education course.*

The following are tips to take with you into the dove field:

- Always wear safety glasses.
- Never shoot at a low-flying bird.
- Always maintain a safe distance from other hunters.
- Be sure to carry a pair of earplugs to protect your hearing.
- The temperature can be hot on Opening Day, so carry water with you to prevent dehydration.
- Obtain permission from the landowner before hunting.

Be sure your *hunting license has not expired before hunting this year. All hunters 16 years and older must have a current license.*

KEN TAYLOR

Kayak Connection

Sea kayaks make perfect crafts for reaching some of North Carolina's more inaccessible camping destinations. See page 12 for more on sea kayak camping.

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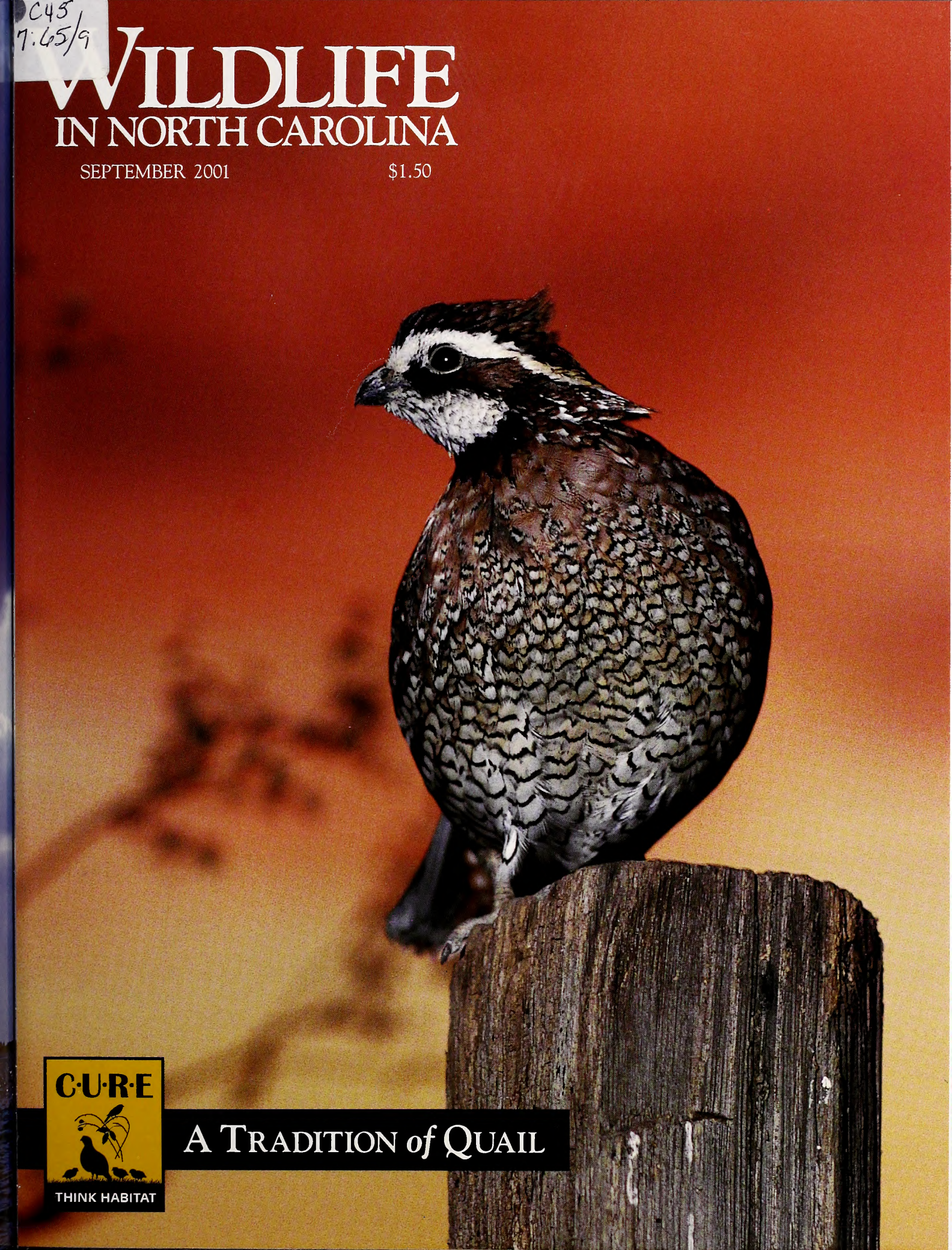
WILDLIFE IN NORTH CAROLINA

SEPTEMBER 2001 $1.50



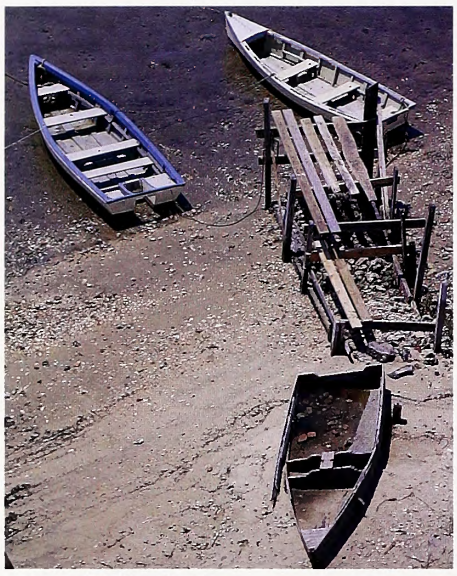
C·U·R·E
THINK HABITAT

A TRADITION *of* QUAIL

This Old Boat

by Jim Dean

I guess I'm in the market for a boat. At least, I'm looking around, but the boat I'm seeking is unavoidably influenced—like a lingering lost love—by the boat that preceded it. I have to admit that the sadness accompanying the disposal of that old boat has surprised me. After all, it had not been used in several years, and only infrequently before that. Yet it occupied one-half of the garage at the family's Emerald Isle beach cottage for so long that it had become a fixture. We hung towels on it to dry, leaned rods against it, stored junk in it and barked our shins regularly on the prop and trailer. Now that it's gone, the cavity it vacated seems enormous, like a pulled tooth.



N.C. WILDLIFE RESOURCES COMMISSION

The boat was a 15-foot Crosby sled built in 1960 (the same year Dad and Mom completed the cottage). It was already showing its age when my brothers and I bought it used for $1,500 in the early 1970s, complete with a rusty trailer and a 65 Johnson Seahorse. A previous owner had rigged it to fish for crappies upstate, and he had drilled the hull in four places to install a Rube Goldberg series of hoses connected to live wells made of old coolers. The hoses had been disconnected, and the holes (two below the waterline) were plugged with rubber stoppers. Because the stoppers tended to pop out at inopportune times, we kept spares stashed so that one was always handy.

It was originally designed as a ski boat, and it had a half windshield and seats up front behind a small well at the bow. What appealed to us were the boat's high sides and the large open space behind the seat—more than enough room for coolers, tackle, bags of decoys and several occupants, including an active Labrador retriever. The trihedral hull was not designed for heavy water, but we learned to compensate—you had to practically come to a stop to cross the wake of a Sunfish. Still, it proved adequate for tidal backwaters, sounds and inlets.

This past May I went down to get it ready to sell. I pulled it out of the garage, hooked a hose to the water intake and put a couple of gallons of fresh gas in the tank. The Johnson fired immediately, as it always had. With the exhaust rumbling like a World War II war bird, I called my brother John on a cell phone.

"Listen to that," I said, holding the phone next to the motor. "I know the steering is faulty, the lift doesn't work and there are all those holes, but there are so many memories. Are we sure we want to get rid of it?"

"Yep, it's time," he answered. "Sure does run good, though."

I cut off the engine and backed the boat into the garage. John would be down in a few weeks. He thought he knew someone who might want it.

Though there was no reason to do so, I spent an hour or two cleaning it up. It seemed strange to think that no longer would we create a mild sensation every time we launched it amidst an armada of $20,000 boats 40 years younger. "How old is that boat?" had become a common reaction.

I chuckled recalling the many times we had launched it without first installing the plug; it is not a sign of seamanship to leap onto a sinking boat and plug a leak in front of a crowd of old salts. I thought of the many times my son, Scott, and I had beached the boat behind Bear Island to throw a cast net for finger mullet so we could drift Bogue Inlet for flounders. I recalled our many duck hunts, including the time we had run across Core Sound in a blinding rain and pounding winter sea. Aged and ugly it might be, but that old boat had served us well, and I knew we would never own another with so much character (which, ironically, was also our reason for getting rid of it).

"Aged and ugly it might be, but that old boat had served us well, and I knew we would never own another with so much character."

In June when I met John at the cottage, I pulled into the oddly vacant garage straddling grease spots and a pile of rust where the boat had been.

"We were not exactly overwhelmed with offers," John admitted. "Finally, my friend Tommy Jones suggested that we donate it to the Core Sound Waterfowl Museum on Harkers Island so they could auction it. I followed Tommy over there as he pulled it, and so much rust fell off the trailer en route that it looked better than it has in years."

"They should have put it on display," I remarked wistfully.

"Yeah, well you might like this better. Fellow who bought it initially only wanted the motor for parts. Got it for $300, but I heard he liked the boat so much he'd taken it to Cape Lookout fishing."

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Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

September 2001 *Volume 65, Number 9*

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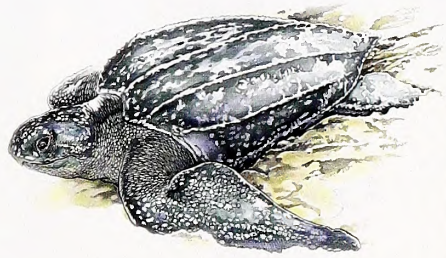

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Cover *A bobwhite quail stands on the lookout, likely keeping a watchful eye for predators. Photograph by Maslowski Wildlife Productions.*

N.C. DOCUMENTS CLEARINGHOUSE

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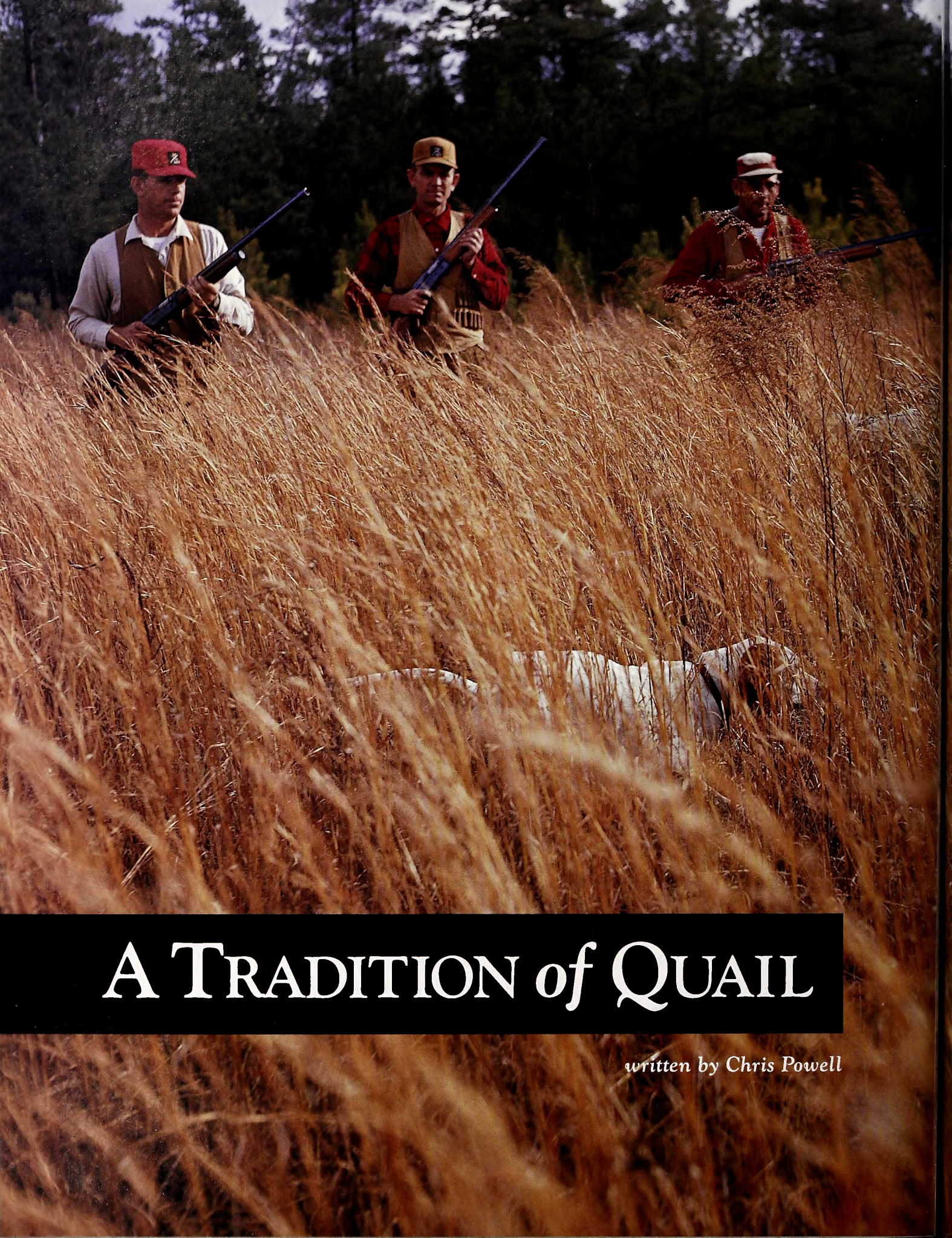


A Tradition of Quail

written by Chris Powell

C·U·R·E

THINK HABITAT

North Carolina has a long-running history with bobwhite quail. Prior to European colonization, the birds are believed to have sparsely inhabited forest clearings, weedy river bottoms and American Indian farming areas. But the arrival of white settlers, with their subsistence farms and cleared forests, unintentionally provided ideal quail habitat, and populations exploded.

The years following the Civil War became a heyday for quail hunters in North Carolina. As a sporting pastime, hunting the birds spanned the economic spectrum, providing game for both poor farmers and wealthy businessmen alike. By the turn of the century, the bobwhite's notoriety was such that vast fortunes were spent pursuing the bird. Wealthy industrialists from the Northeast, wishing to emulate British gentry, purchased or leased tens of thousands of acres and built grandiose hunting lodges in the Piedmont of North Carolina. The clubs claimed such members and guests as President Franklin D. Roosevelt, financier J.P. Morgan and Clarence Mackay, owner of Postal Telegraph Co. The most famous of these lodges was Fairview Park, built near High Point in 1896 by W. Gould Brokaw, grandson of railroad tycoon Jay Gould. When completed, the "sporting lodge" had three stories, measured 160 feet across and cost about $500 million. And the hunting at these estates was nothing short of phenomenal. At Climax Lodge, in Guilford County, J.P. Morgan Jr. and his associates reported shooting 5,590 quail between 1899 and 1904—and the club enforced a daily limit of 40 birds per member.

N.C. ARCHIVES AND HISTORY

Showing the take of probably one day's hunt, this 1940s photograph is indicative of just how prolific quail populations were at one time in North Carolina. However, habitat loss—not overhunting—was the ultimate cause of this species' decline.

But the period of sporting opulence was short-lived in North Carolina. Antitrust laws and later the Great Depression sapped the wealthy's discretionary spending. And clean farming and other habitat changes signaled the start of the long downward trend in quail populations that continues today.

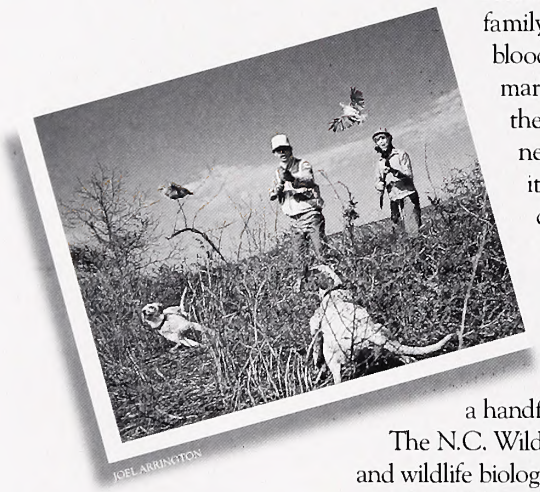
In his 1903 Third Annual Report of the Audubon Society of North Carolina, conservationist Thomas Gilbert Pearson looked to the future of quail hunting, writing: "We believe that by proper protection, large areas of our state can in time veritably be made vast game preserves, which will be of great wealth to the state."

Pearson's words may prove prophetic. The N.C. Wildlife Resources Commission recently embarked on an ambitious project to promote quail habitat across certain large expanses of landscape. By partnering with private landowners, wildlife biologists hope to come close to creating the type of habitat that produced the legendary hunting of old. The hope is that North Carolina can hold on to a fading aspect of its sporting heritage, and that the sounds of spring will always include the unmistakable whistle "bob-white."

F. ELOISE HESTER

The Quail Question

A recent study headed by North Carolina researchers has put to rest a number of questions surrounding the decline of our quail populations.



JOEL ARRINGTON

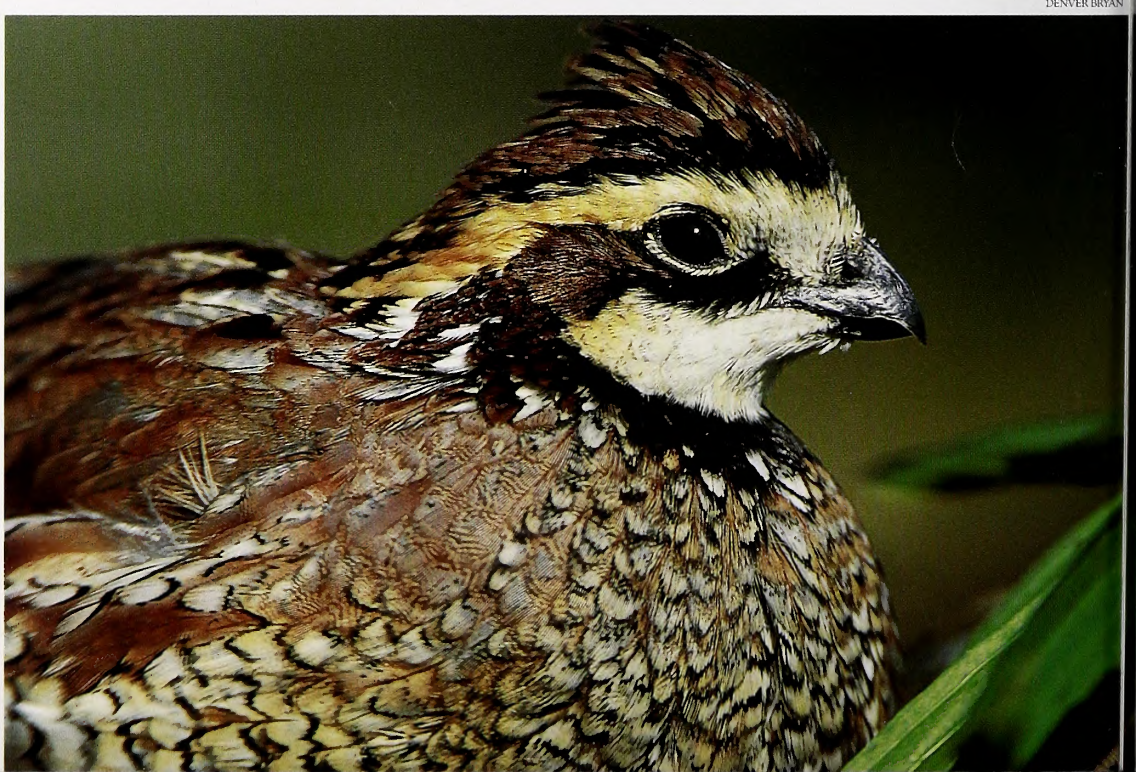
Brier-scratched knuckles, a bird dog locked into position, a covey's burst into midair. These images of bobwhite quail hunting in North Carolina encompass a long tradition of family stories, favorite shotguns and bloodline litters. Yet the sport that has marked the end of harvest season and the approach of winter appears to be nearing somewhat of a conclusion itself. During the past few decades, quail numbers have plummeted, mostly a result of wholesale landscape changes. The same farms on which your grandfather or father may once have easily shot a limit of quail now may hold only a handful of birds, if any at all.

The N.C. Wildlife Resources Commission and wildlife biologists from N.C. State University and the Tall Timbers Research Station in Tallahassee, Fla., have been making a concerted effort to determine how best to restore quail populations to their former prominence. One of the more significant strides toward this goal is the recent completion of a four-year N.C. State University study that documented practices that benefit quail and whether or not those practices can be economically feasible for farmers.

"When we started work in 1991, we wanted to know answers to relatively specific questions, and one of them was this: Are pesticides used in agriculture the reason for the decline of quail?" said Pete Bromley, an N.C. State University professor and principal investigator for the quail study. Some other questions were addressed as well: Is clean farming the reason for the decline, and, in particular, are the mowing of drainage ditches and the clearing of the field edges of farm fields tied to the decline of farmland quail populations? In 1997 the team expanded its research to determine if predators are a factor in quail declines.

The first question was actually answered in 1995 by Bill Palmer, now the chief game bird researcher at Tall Timbers, a Florida quail research facility. Quail were held in sections of a soybean field that were sprayed with either a pesticide or water. Researchers discovered quail in the areas sprayed with pesticides showed no difference in brain activity from quail in those areas sprayed with water. The quail within the pesticide-applied areas also showed no reproductive problems later that year. Although the liquid form of

DENVER BRYAN



There is nothing quite like the thrill of witnessing a covey's burst into air. Though quail numbers are down, the species is in no danger of extirpation, and quite a few North Carolina hunters still participate in the sport.

pesticides was determined not to be a direct cause of quail mortality, researchers did find that highly toxic agrochemicals in granular forms were being mistaken for grit and consumed by birds. Quail mortality was documented with certain pesticides such as Furadan. However, the fear that farmers were unknowingly killing off quail by spraying liquid pesticides on crops (the preferred crop treatment) proved unfounded.

Satisfied that most pesticides weren't having a direct effect, the researchers then turned their attention to habitat, which they had suspected was the culprit all along. The statistics of farm loss and, of course, farm habitat are telling. Between 1950 and 1992, North Carolina lost an average of 2,000 farms per year. In that same period, the amount of farmland decreased from 21.2 million acres to 8.9 million acres. And since 1949, the idle acreage of North Carolina farmland (considered vital to quail populations) has decreased from 1.7 million acres to less than half a million at present. As the number of fields and idle fields decreased, quail populations almost exactly mirrored the trend, (see "A Parallel Decline").

In 1997 Bromley and a number of N.C. State graduate students initiated an experiment to determine what could be done to present-day farms to create habitat that would produce quail. They received additional support from the Wildlife Commission, the N.C. Division of Water Quality, Quail Unlimited, the U.S. Department of Agriculture and the Virginia Department of Game and Inland Fisheries. The project comprised four sets of four farm units (16 farms total), with one set each in Hyde County, Tyrrell County, Wilson County and Amelia County, Va. Each site was chosen specifically to represent a typical 300- acre farm located in the lower Coastal Plain, the upper Coastal Plain or the Piedmont.

On two of the sets of fields, 10- to 15-foot field borders were established around every field edge, as well as along every ditch and farm road. The borders were created by taking farmland out of production and allowing the areas to grow up in natural vegetation. However, the farms in Virginia experienced two years of drought, and the field borders did not succeed. Subsequently, the Virginia farms were used to look only at what effect predator control had on quail populations.

The natural grasses and other plants that grow in field edges are used by quail for food, shelter and camouflage from predators. Biologists hoped to nail down to what extent such cover protects quail from predators. Animals such as foxes, raccoons and opossums, as well as feral dogs and cats, are nest predators known for eating quail eggs, chicks and adults. To determine the value of cover, field borders were established on one set of farms, and diligent trapping was conducted to remove predators. As a measuring stick, the second set of farms had prescribed field borders but no trapping, the third set of farms was given predator reduction but no field borders, and the fourth set of farms had neither field borders nor predator reduction.

Having established the parameters for the experiment, the biologists proceeded to conduct covey-call counts on each of the farms. Researchers visited the farms between late September and mid-October and listened for the bobwhites' covey-call whistle. During the three-year period, the average number of coveys heard was 5.05 for the farms prescribed with field borders and predator reduction, 3.9 on the farms with just field borders, 2.06 for the farms that had only predator reduction, and 2.16 coveys for the farms with no treatment.

"The habitat was available for assessment in 1998, 1999 and 2000. In the fall, we went out and listened to coveys at dawn," Bromley said. "Statistically, there is no doubt that field borders result in more quail coveys. Also, when you look at comparing the areas where predators were removed and areas where predators were not removed, we heard the same number of coveys on farms where we removed the predators as on the farms where none were removed."

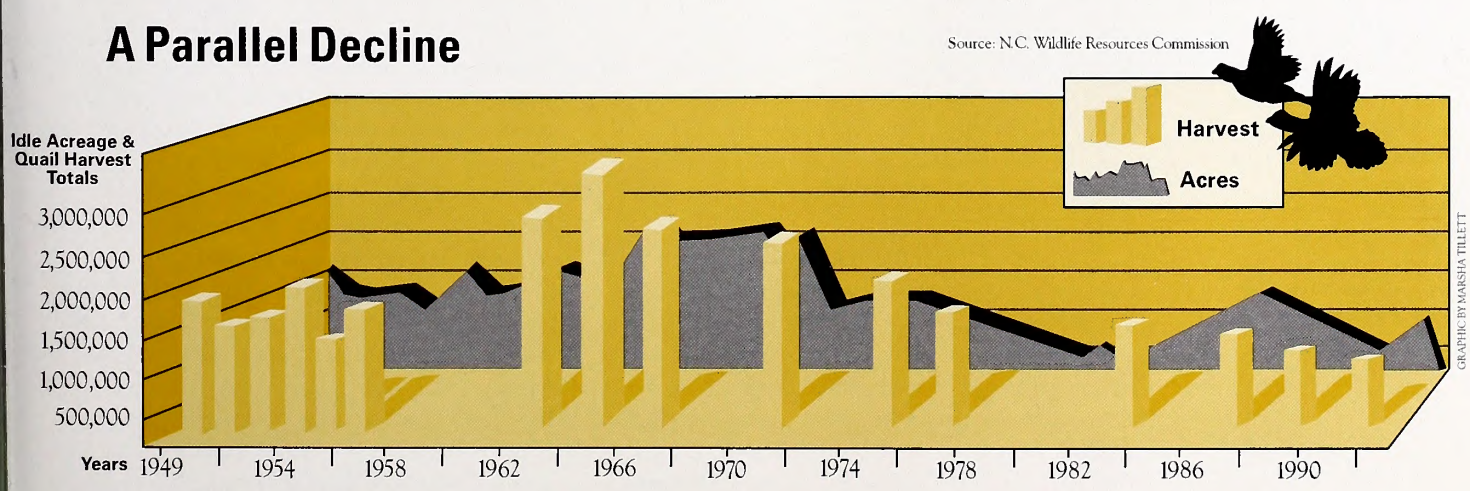
How could that be? If you remove the animals

MELISSA McGAW

A trap is set to remove predators from a farm used for a quail experiment. By measuring quail success at farms with trapping against farms without, biologists were able to determine to what extent and under what conditions predation affects quail numbers.

A Parallel Decline

Source: N.C. Wildlife Resources Commission



GRAPHIC BY MARSHA TILLETT

The amount of idle farming acres and harvested quail appear to be directly related. Quail harvest totals were obtained from the Wildlife Commission's hunter mail survey. Harvest amounts were not available for every year.

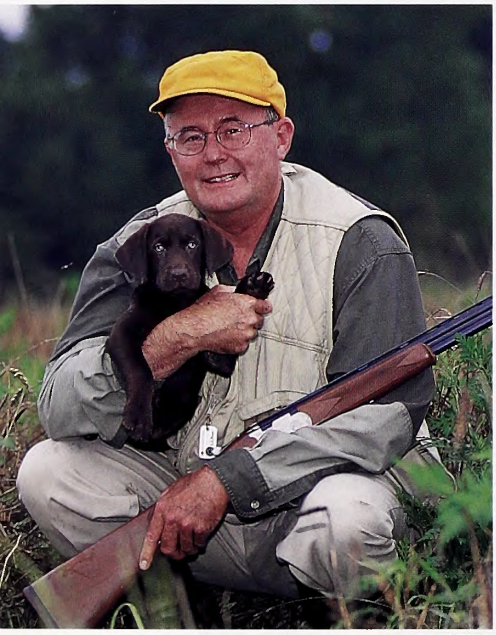
C·U·R·E
THINK HABITAT

that eat quail, you will have more birds, right? Wrong. There is a saying in the biology field: "Mother Nature can't stand a void." Which means that anytime an animal is removed from an area, other animals will immediately move into the vacancy. For example, a total of 377 predators were removed from the eight farms in 1997, 369 were removed in 1998, and 400 in 1999. One would think that the removed-predator totals would drop dramatically each year; however, the numbers either stayed about the same or increased.

> **"Hopefully, we can begin to gradually replace that almost reverence for the clean farm with a view that the farm needs to be good for wildlife and not just visually appealing to people."**
>
> **—Pete Bromley**

Moreover, Bromley believes that the research results point out a critical interaction between cover and predation. Notably, whereas just reducing predators on farms had no effect, the combination of removing predators and providing cover did have an effect.

Marc Puckett, who worked with Bromley as a graduate student, provided a clue to how this might happen. Having placed radio devices on 240 quail, Puckett observed that the birds in early spring selected farms with field borders rather than those without them. Early nesting success was low. But during midsummer, when the soybeans were canopied over, nesting success rose to more than 50 percent, and the vast majority of the nests were in fields ringed by field borders. On those farms where predators were removed, there was likely less pressure from predators. This meant that more hens made more nests in the crop fields, resulting in more coveys in the fall.



JODY DUGGINS

Pete Bromley, an N.C. State University biology professor, headed the four-year quail study, which recently concluded. With his new best friend, he hopes for many memorable days afield.

Though predators receive most of the blame for low quail populations, the research clearly indicates that nesting and brood-rearing habitat is the most important limiting factor on farmland. Predator trapping had a significant impact only after providing field borders. "Quail enthusiasts would be far better off economically and biologically to put limited financial resources into habitat than into predator control," Bromley said.

Having established the importance of field borders, Bromley's study then focused on the economic viability of allowing strips of farmland to revert back to natural vegetation. The researchers measured swaths from combines harvesting various crops sowed directly up to windrows, ditches and farm roads. Crops planted around the edges of fields are often shaded out by trees, subjected to different soil types and forced to compete for water and nutrients.

"We found that yields were predictably much lower on the edges of fields than at the centers of fields," Bromley said. "We did the economics on this and found that with a low-value crop like corn, farmers were probably losing money by tilling, planting, treating with pesticides, then harvesting corn around the edges of fields. With a relatively profitable crop like soybeans, they were breaking even or coming out a little ahead in these low-yield areas, on average."

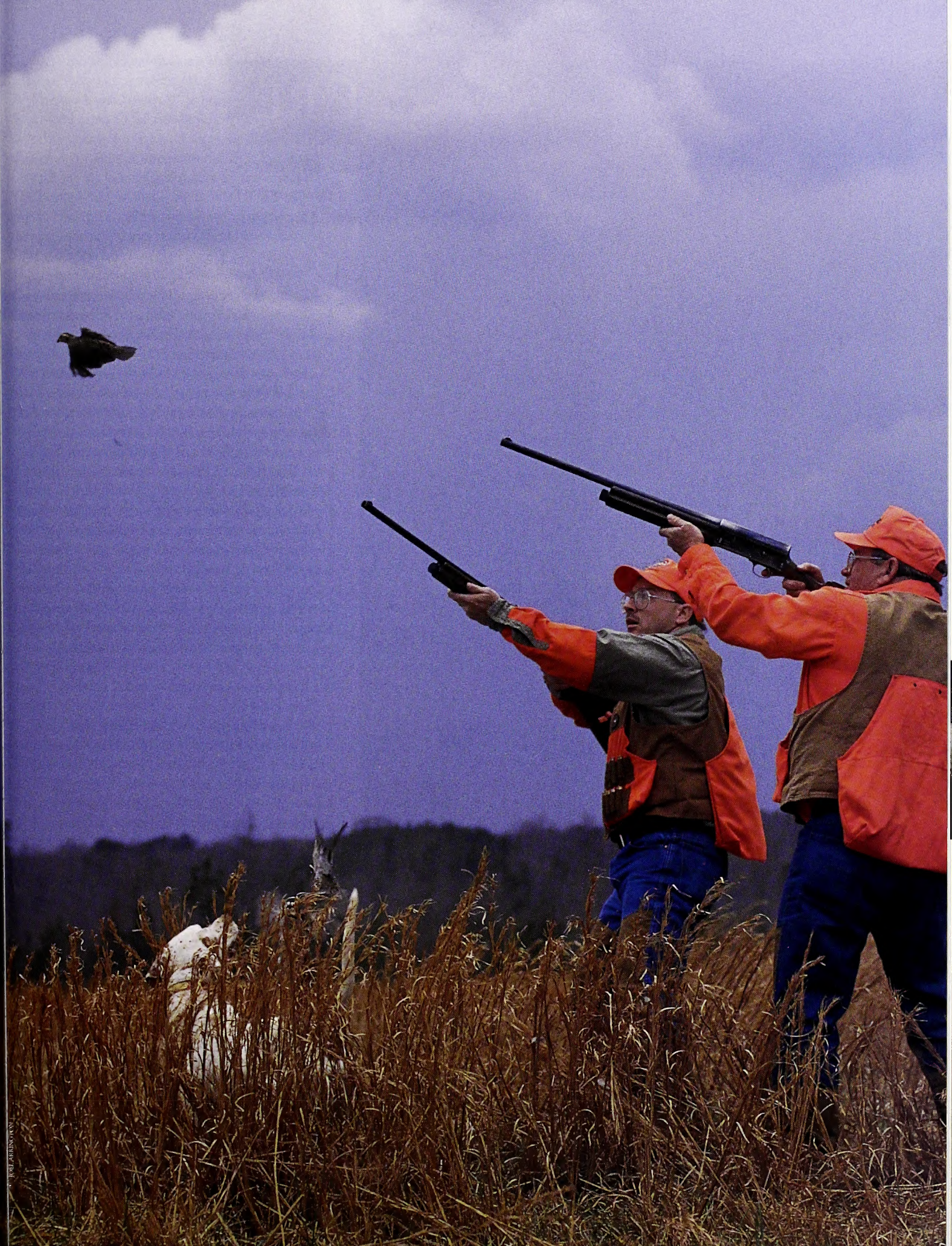
Another question regarded the possibility that noxious weeds or crop pests could be attracted to field borders. The study discovered that after the first year, the field borders no longer supported noxious weeds. In addition, the field borders were found to attract the predators of field pests, such as spiders, thus neutralizing any potential crop-insect damage. "Sampling of pests in fields indicates that field borders rarely harbor more pests that make crops worse and often have beneficial insects," Bromley said.

The question now is this: Will farmers begin establishing practices beneficial to quail and other small game? If recent history is any indication, widespread implementation of field borders is doubtful. The problem is really twofold. First, economics dictates that farmers squeeze as much profit as possible from every square foot of a farm. Second, a pervasive opinion exists that it is socially unacceptable for farmers to allow their land to grow up in weeds. An unkempt farm is considered a sign of laziness and can be compared to how a homeowner might feel about neighbors who never mowed or raked their yard.

"Hopefully, we can begin to gradually replace that almost reverence for the clean farm with a view that the farm needs to be good for wildlife and not just visually appealing to people," Bromley said.

Which is what must realistically happen for quail populations even to resemble their former glory. European settlers, subsistence farms and cleared forests once brought a golden era for quail. Thousands of small farms spread across the state, producing ideal habitat, and bobwhite populations mushroomed. Known for its heart-stopping wing shooting, a culture of quail hunting developed that ran strong until after World War II. But larger farms, bigger machinery and precise growing methods led to the gradual decline that continues.

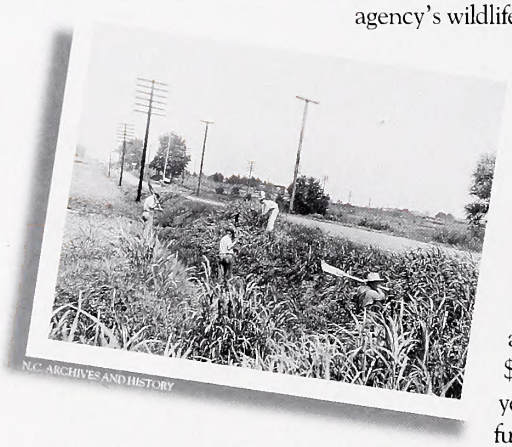
The challenge is how to turn back the clock along the edges of fields, fences and ditches, while ensuring that all other cropland remains firmly rooted in the present. Researchers believe they have learned what it takes to strike that careful balance. Now it is time to see if a new course of action by the N.C. Wildlife Resources Commission can bring about a new era for North Carolina's most traditional game bird. ⊠



LOOKING FOR A CURE

An ambitious undertaking to promote quail and other grassland species is signifying a new era of wildlife management in North Carolina.

The success of the N.C. Wildlife Resources Commission's big-game programs has been nothing short of phenomenal. Black bears are thriving in the Coastal Plain and increasing in the Mountain region. Wild turkeys are now in every county in the state and spreading rapidly. White-tailed deer populations are higher than at any other time in history. At one time, it may have been doubtful if any of those species could recover. But they have, and with those achievements has come a new emphasis for the agency's wildlife management division.


N.C. ARCHIVES AND HISTORY

Using bush axes, workers clear a ditch bank along a road near Raleigh during the mid-1900s. There was a time when all such work was done by hand, leaving an ample supply of nesting habitat that produced numerous young quail (right).

For at least the next five years, promoting small-game populations will be the main focus of the commission's wildlife management division. The new initiative is called the CURE (Cooperative Upland-habitat Restoration and Enhancement) program. Eight new staff positions, as well as funding in the amount of $1 million initially and $700,000 per year for the next five years, were recently approved. The funds will come from the Wildlife Commission's Endowment Fund.

Attempts to shore up beleaguered small-game populations are nothing new for the Wildlife Commission. In fact, wildlife biologists have been wrestling with the problem since the agency was created in 1949. What is new, however, is the method to be used. Previously, biologists took a statewide approach, passing along technical advice to landowners and enrolling their property into cost-share programs designed by other agencies to offset the expense of creating wildlife habitat. This produced isolated pockets of favorable habitat sprinkled among areas of mostly poor habitat, and quail populations have been largely unaffected.

The CURE program, however, will be vastly different, with money and manpower concentrated in specific areas that have been determined as most likely to benefit quail populations. "In this program, we have identified what we are calling focal areas," said David Cobb, chief of the Division of Wildlife Management. "We've got three geographical focal areas. And within those, we will have qualified landowners and groups of landowners; we are calling them cooperatives. We will be providing them with technical guidance and assistance. For landowners outside of these individual areas, we will be providing just technical guidance."

One focal area will be located in the northern Coastal Plain, a second in the southern Coastal Plain and a third in the Piedmont (see map). Because the western portion of the state's habitat is so vastly different, and the decline of the ruffed grouse is the overriding issue, Cobb said the Mountain region will be addressed separately.

To determine which regions hold the best potential for quail management, wildlife biologists used a Geographic Information System to analyze habitat compositions statewide. Looking for mostly undeveloped agricultural areas, biologists classified portions of the state as unsuitable, marginal or high-quality habitat. "Once we had that habitat map, we looked at areas where the marginal and suitable habitats were clustered; and the areas where those habitats were densest are the areas we ended up using as our focal areas," Cobb said.

Within those three focal areas, the Wildlife Commission decided that 5,000 contiguous acres of land would be the minimum needed to develop the type of habitat necessary to produce quail. To achieve that amount of acreage, the Wildlife Commission will be looking for groups of landowners willing to enroll their property in the program for a minimum five-year period. When a total of at least 5,000 contiguous acres is accumulated, the Wildlife

MELISSA McGAW

Commission will begin working with each landowner to prescribe a management plan.

The work will be aimed at farmland as well as wooded areas. Quail need overgrown field borders that connect to a food source. If the birds are forced to travel over open ground, they become easy targets for four-legged predators and raptors. The borders, as well as weedy wooded areas, also provide habitat good for camouflaging nests, and the grass seeds and insects provide a food source for the chicks once they hatch.

To provide this type of habitat, the windrows along the field need to be pushed back at least 15 feet all around. Once a border has been cleared, it can be disked and allowed to grow up in native vegetation, which is akin to home cooking for quail. Prescribed burns—fires set intentionally to create habitat —will also have to be periodically conducted to thin the woods of saplings, remove leaves and limbs from the floor and encourage grasses to grow.

But to accomplish this, the landowner can expend a good deal of time, labor and money. A unique aspect of the CURE program is the Wildlife Commission's willingness to provide cooperating landowners with either labor at no cost or funding sources that cover almost all of the expenses. "Our approach to this program is to try to develop innovative ways that this work can be implemented on the ground, basically at no cost to the landowner," Cobb said. "But the landowner has to be willing to dedicate the land and be willing to enter into a five-year agreement with us."

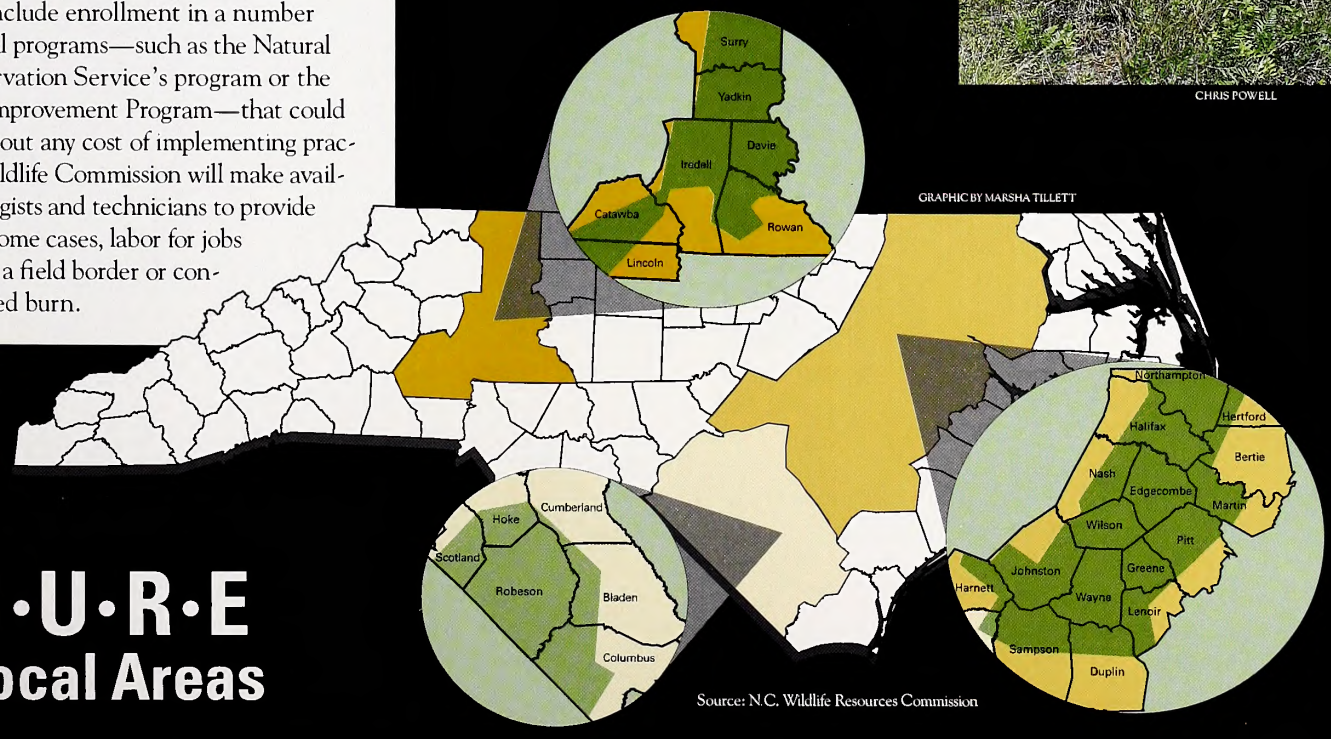
The resources that will be made available to landowners will include enrollment in a number of state and federal programs—such as the Natural Resources Conservation Service's program or the Wildlife Habitat Improvement Program—that could potentially cancel out any cost of implementing practices. Also, the Wildlife Commission will make available crews of biologists and technicians to provide guidance and, in some cases, labor for jobs such as bulldozing a field border or conducting a controlled burn.

KEN TAYLOR

Wildlife biologist Terry Sharpe works with a landowner to determine the best approach for managing quail habitat. Provided the landowner has property enrolled in the CURE program, the Wildlife Commission is willing to assist with conducting controlled burns.

CHRIS POWELL

GRAPHIC BY MARSHA TILLETT



C·U·R·E Focal Areas

Source: N.C. Wildlife Resources Commission

Within each of the green highlighted regions, the Wildlife Commission will encourage landowners to enroll properties totaling at least 5,000 acres in the CURE program to help small-game and other grassland species.

"There are lots of opportunities for landowners to contract with local people to do this work," Cobb added. "So it's not that we have to do it all. But there are situations, we believe, where if we were not available to do some of it, we would have a hard time getting the practice on the ground. And prescribed burning is a good example."

Some people might question the use of public money to perform work on private land. Nevertheless, biologists believe that quail have declined because of changes to private land, and that is where the battle must be fought first. And remember, deer were stocked on private land in the 1940s, and turkeys have been stocked on private land more recently. The benefits of both these species' recovery have spread to all citizens of the state, and Cobb believes the quail effort could have a similar result.

"If we can show that we can reverse the trend," he said, "even though it is on private land, over the long term those benefits will spill out to other people and not just these landowners."

And the CURE program does have some initial benefit to the general public. The cooperative agreements allow the Wildlife Commission to work with the landowners to provide permitted public quail hunts on the property. These will be conducted through the commission's permitted hunt system and will be limited and tightly controlled. Also, an effort is being made to identify game lands (open to the general public) with the potential for good quail habitat and to concentrate management work within those areas.

"It's important to try and restore a habitat type that we have, to a large degree, lost, and the wildlife that goes with that. If we can bring back quail to the point that there are enough to hunt, I think that is an added benefit."

—David Cobb

For the long term, biologists hope that once a number of cooperatives have been established, other nearby landowners will want to join, and the 5,000-acre blocks will grow and possibly connect.

But the immediate question is this: Will enough landowners buy into the concept initially? It appears that the Wildlife Commission may already have an answer. In the Piedmont focal area, a group of mostly farmers who own land near Turnersburg in Iredell County have agreed to enroll their property in the CURE program. Jerry Lundy said he enrolled his property because of a sentimental attachment to a sport he grew up with. "I quail-hunted years ago

Field edges, such as the one shown behind the tractor, are vital for quail habitat. By allowing a 15-foot strip of land along the field edge to grow up in natural vegetation, landowners can provide nesting areas, cover and food for quail and other wildlife.

when there were quail in this area, and there has been a decline. I have enough appreciation for wildlife that I knew something had to be done," he said. "The thing I like best about the program is that the Wildlife Commission has taken some initiative, and they are offering some guidance and leadership; it's impossible to get that many people together without the state taking the lead."

Work began this past spring on what biologists have dubbed the Turnersburg Project, which has become a sort of pilot program for CURE. So far, hedgerows are being established, and Wildlife Commission employees have used herbicides in an attempt to eliminate fescue (a non-native grass that has little value to wildlife) and establish warm-season grasses in its place. In addition to indicating landowner acceptance of the program, this particular project should show how quail populations respond to the practices.

Which bring us to how the Wildlife Commission will define success within the CURE program. At least initially, Cobb said, he and his staff will not be thinking in terms of achieving a certain percentage increase in quail. Instead, success will be a step-by-step process. "I will consider the program to be an initial success if we can demonstrate in all three focal areas that there are groups of landowners who are willing to pool together 5,000 or more acres," Cobb said. "I hope we can then impact between 2 and 10 percent of the landscape enrolled in the program. Next, we need to see that we have an increase in quail and songbirds. Long term, we will have to nail down just what type of percentage increases we should expect."

During the past several decades, quail populations have declined 60 percent in North Carolina. So it would stand to reason that an equal amount of increase within the cooperatives would be considered a monumental achievement. But why, one may wonder, do quail warrant such discussion and commitment of time and resources? Though down, their populations are still scattered across the state, and the species is not in danger of extinction. Cobb believes the push is really about the loss of early-successional habitat and the number of quail, rabbits and songbirds this state once had. "It's important to try and restore a habitat type that we have, to a large degree, lost, and the wildlife that goes with that," he said. "If we can bring back quail to the point that there are enough to hunt, I think that is an added benefit."

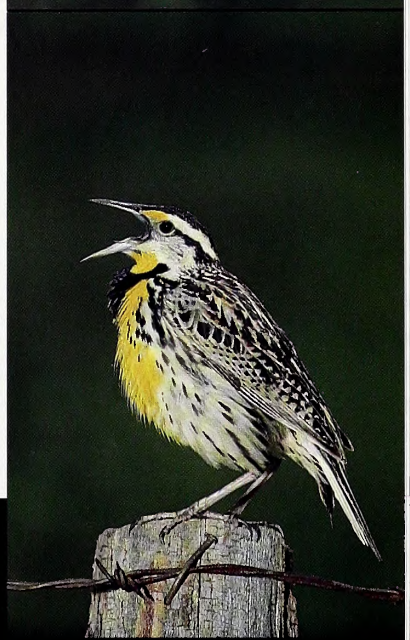
But can that goal really be accomplished? If bears, deer and turkeys are any indication, wildlife biologists should not be counted out. ⊠

Have any thoughts about these stories? E-mail Chris Powell, managing editor, at powell.chris@coned.wildlife.state.nc.us.

MELISSA McGAW

DERRICK HAMRICK

Though the CURE program is directed toward quail, both game and nongame species will benefit such as the cottontail rabbit and the eastern meadowlark.



MASLOWSKI WILDLIFE PRODUCTIONS

Want to Learn More?

Though three initial CURE areas have been selected for this year, others will be chosen in the future as funding becomes available. For more information about the CURE program, call the N.C. Wildlife Resources Commission's Division of Wildlife Management at (919) 733-7291. Also, *Tar Heel Wildlife on the Farm*, a free Wildlife Commission booklet, is available. The 16-page publication covers small-game management techniques that any private landowner can implement. Forest management, food development and hedgerow maintenance are among the many topics included.

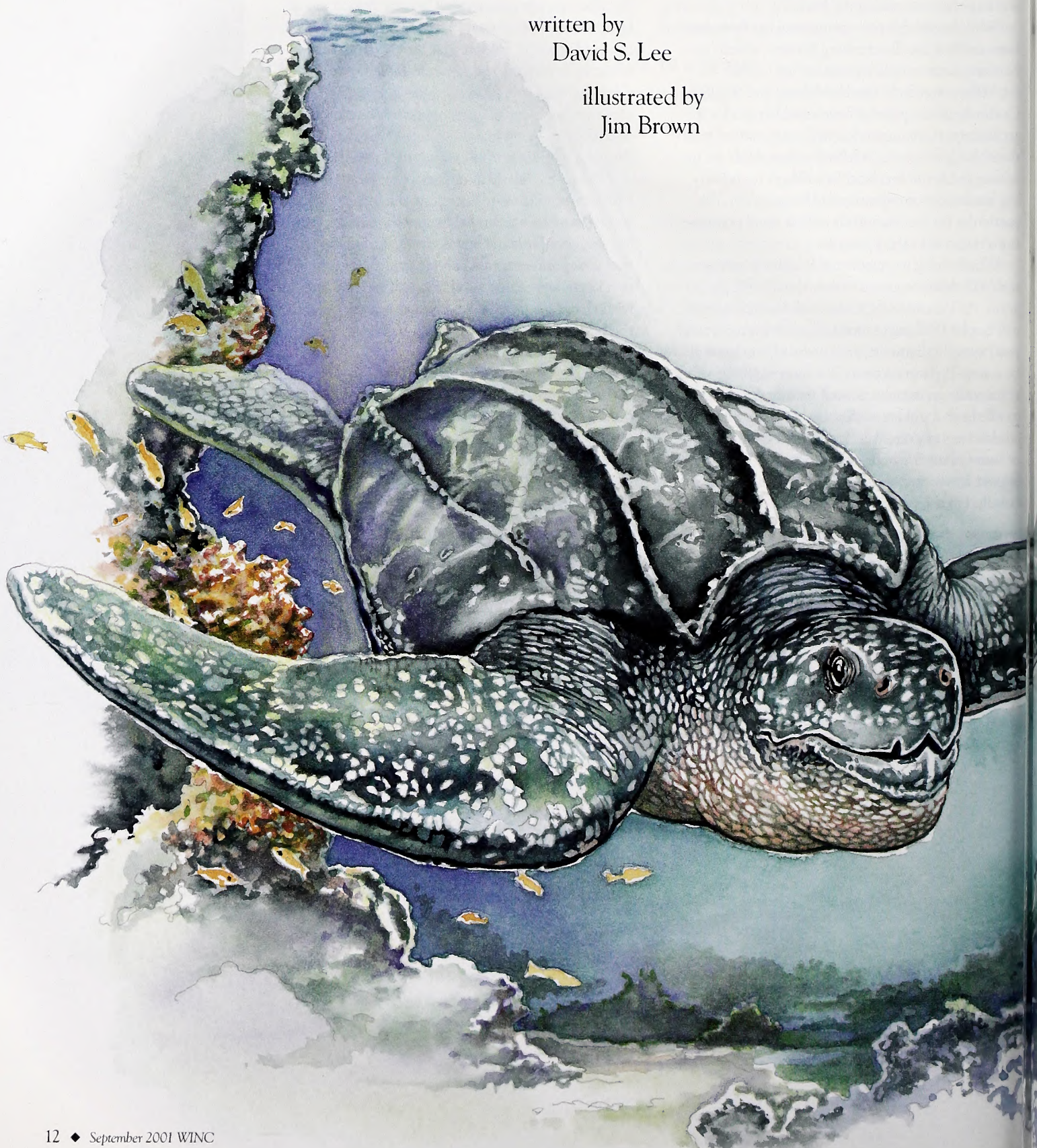
C·U·R·E

THINK HABITAT

Hide *of* Leather

written by
David S. Lee

illustrated by
Jim Brown



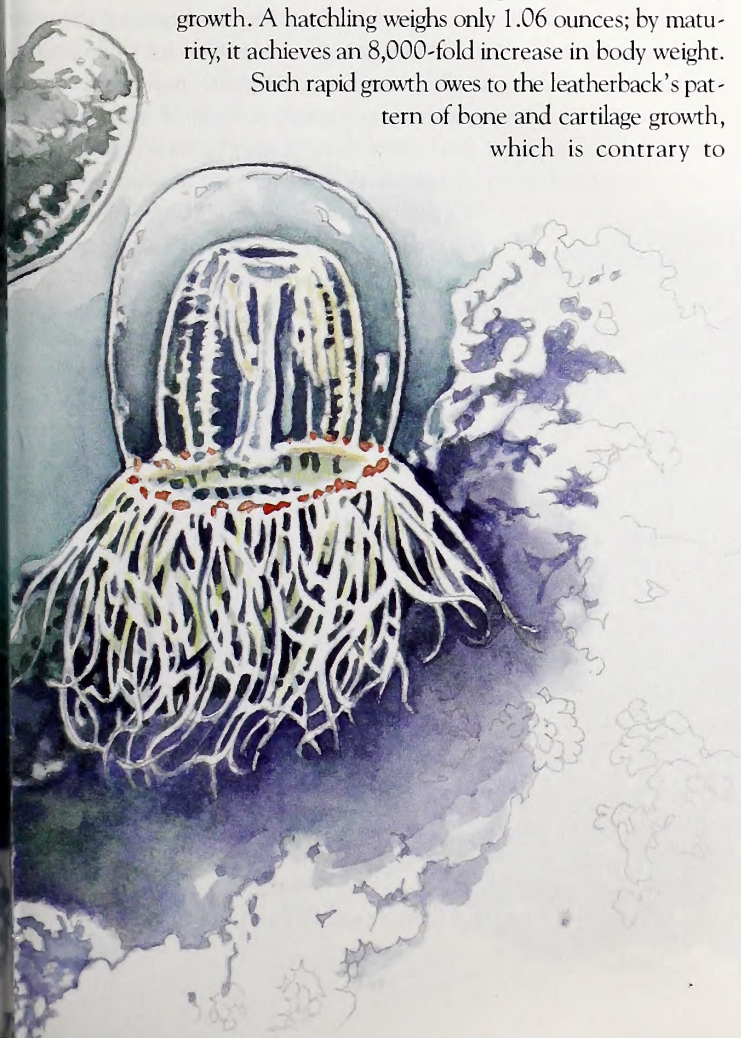
and a *Warm Heart*

Think you have a good idea of what reptiles are all about? Meet the leatherback.

The leatherback turtle, one of four species of marine turtles that occur in North Carolina waters, exhibits the most bizarre lifestyle of any sea turtle—perhaps of any reptile. The leatherback represents a living reptilian counterculture and gives us cause to pause and wonder. Spectacular in size and specialized for survival, it belongs on the front page of the zoological tabloids.

A seven-foot leatherback has flippers that spread nine feet from tip to tip. The leatherback's record length of 10 feet, 3 inches is surpassed among existing reptiles by only the anacondas, several pythons and various crocodiles. But in total mass, leatherbacks win. Only an occasional giant 20-foot crocodile can top their record weights. The largest leatherback ever weighed hit the scales at 1,902 pounds, and the biggest individuals have never been weighed because their huge size prohibits it.

Although other turtles are renowned for their slow growth, leatherbacks exhibit incredibly rapid skeletal and body growth. A hatchling weighs only 1.06 ounces; by maturity, it achieves an 8,000-fold increase in body weight. Such rapid growth owes to the leatherback's pattern of bone and cartilage growth, which is contrary to that of any other reptile and totally different from that of any vertebrate. Leatherbacks have vascularized cartilage that superficially resembles that of birds and mammals; the blood supply into cartilage and bone allows for very rapid growth. Biologists have discovered that the cellular structure in the growing tips of a leatherback's bones is unique to the species.



One of the prime characteristics of reptiles—scales—is completely lacking in leatherbacks. The tiny, nearly invisible scales that cover the shell and extremities of hatchlings disappear almost immediately after birth. Then the turtles begin to develop thin, irregular plates of bone in their leathery skin. Seven ridges that run the length of their leathery bodies provide structural support. And they don't have claws on their flippers as other turtles do.

In fact, the species is so odd that herpetologists have placed it in a sister group to all other turtles, in the suborder Athecoidea. The leatherback's anatomy and its bizarre physiological adaptations have led some herpetologists to speculate that it represents an independent evolutionary line from some unknown freshwater ancestor that preceded today's seagoing species.

Adaptations

With recorded dives to depths of more than 3,000 feet, leatherbacks are among the deepest divers of air-breathing vertebrates. Their sustained deep dives and respiration biology cannot be explained through what is known about reptilian physiology. Researchers have concluded that leatherbacks have independently developed the same respiration adaptations for diving that exist in deep-diving marine mammals.

A leatherback's respiratory rate is 22 percent lower than that of active green sea turtles, and its tidal air volume is twice that of greens. The leatherback's lung capacity, however, is only 25 percent greater than would be predicted based on its size in relation to other reptiles.

Leatherbacks also stay constantly in motion. Contrary to alligators, lizards and other reptiles that go anaerobic during even brief periods of intense activity, leatherbacks appear to be able to increase activity and still supply oxygen to muscles through normal breathing. They do this by a combination of oxygen stored in active muscle tissues, enhanced circulation, large tidal air volume and various adaptations in blood chemistry such as high hemoglobin concentrations.

Because of their tropical nesting habits, leatherbacks were long assumed to be tropical like other marine turtles, and records of sightings in northern seas were believed to represent misplaced vagrants. We now know that these turtles regularly follow drifting schools of jellyfish—their main food—northward to high-latitude seas. Cool water holds more oxygen and supports more life than tropical seas do.

And the long days of summer in the northern latitudes produce vast quantities of phytoplankton that generate massive populations of jellyfish. With decreasing day length, the turtles retreat to temperate and subtropical seas.

Leatherbacks are not obligate bottom-feeders like other marine turtles. Although they can feed on the sea's floor, they also feed from the surface and within the water column, which all but breaks their ties to shallow shelf-waters. Among the most aquatic of turtles and the most pelagic, leatherbacks are the most widely distributed reptile, occurring throughout the waters of the Atlantic, Pacific and Indian oceans. Adult individuals regularly migrate across oceans from tropical nesting beaches to subpolar seas. Female leatherbacks tagged in French Guiana have been recovered off Florida, Georgia and South Carolina. In 1988 a turtle tagged in French Guiana was discovered four months later off Newfoundland. Other tagged females from the same nesting beach have been sighted in Spain, Morocco and France. Some of these represent multiple captures, suggesting that these movements are not exceptional but the norm.

How does a cold-blooded, tropical reptile manage to stay functional in northern seas? In the early 1970s, researchers found that in the 45-degree-Fahrenheit waters off Nova Scotia, leatherbacks maintain body temperatures of about 80, prompting speculation they are actually warm-blooded. In 1972 a number of researchers examined a leatherback that had died at the New England Aquarium. They discovered that although to some degree its temperature is controlled metabolically—as in birds and mammals—the leatherback also contributes to its own temperature regulation: Constant swimming keeps it warm. And the leatherback's large size relative to its body surface area allows it to store heat efficiently. Its leathery shell insulates the bulk of the leatherback from the cool water, and the oils in its body act as heat reservoirs.

This leaves one small but important obstacle to overcome: Blood circulating out into the long flippers cools quickly in subarctic waters. Muscle activity alone could not generate enough heat to keep the blood from cooling.

A careful dissection of the New England Aquarium specimen showed that the outgoing veins (cool blood) in a leatherback's flippers wrap around the incoming arteries (hot blood). By the time it reaches the heart and lungs, the turtle's blood temperature is back up to 80 degrees. Moreover, special lipids in the flippers act as antifreeze.

In the tropics where the seas are warm, leatherbacks keep cool by hunting mostly at depths where the water is cooler than 80 degrees, and they can cut back on muscle activity. Their large size not only stores heat; it also prevents a rapid buildup of heat. Leatherbacks make only brief visits to the warm surface waters, and the females crawl ashore to lay their eggs at night, when air temperatures are cool.

All these adaptations support the leatherback's lifestyle. These turtles are constantly diving, sometimes staying submerged for nearly half an hour at a time. Active around the clock, they spend as much or more time diving as they do on the surface, conducting as many as 50 deep dives in a 24-hour period.

Unsolved Mysteries

No other reptile can match the leatherback's range of sounds. When captured or attacked, the leatherback emits moans, whistles and screams, even though it has neither a larynx nor a birdlike syrinx. The leatherback regulates sound by modifying the opening to its trachea, which contains elaborate jointed bones that can move independently. Despite its unexplained vocal ability, a leatherback has hearing that is probably no different from other turtles. Its ears lack eardrums and contain massive fat deposits.

Another unsolved leatherback mystery involves its feeding habits. Of all the world's 260 or so species of turtles, this is one of the most highly specialized feeders. Although it sometimes eats sea urchins,crustaceans, mollusks, squid, fish, tunicates and algae, its primary food is jellyfish, and to a lesser extent the Portuguese man-of-war. Researchers suspect that on their deep dives, leatherbacks are seeking out bioluminescent jellyfish and glowing tunicates.

The turtle's mouth and throat is lined with white spines up to 2 inches long. Thick and pointed back toward the esophagus, these spines continue down

much of the leatherback's upper digestive tract—a 6-to-7-foot-long (and sometimes longer), spine-filled cylinder that makes more than a full loop on the left side of the turtle's body cavity. As the leatherback sucks in jellyfish—and with them large amounts of seawater—the downward-pointing spines hold the jellyfish and jellyfish scraps in place when the turtle expels the water back up through its digestive system. The long esophagus may also be a food storage area that allows a leatherback with a full stomach to continue to feed. But how an animal this large survives from digesting the little amount of protein in the watery tissue of jellyfish is unknown.

Despite all of the leatherbacks' bizarre differences, most biologists do not think that the marine adaptations of these turtles are derived independently from those of other marine turtles. The leatherback just took on a far greater degree of specialization than any of our other living, more lethargic turtles.

The fossil history of leatherbacks is far from complete, but one thing is apparent: Even though only one species survives today, several different leatherback lineages existed in the past at one time or another, and several occurred concurrently. Over the past 50 million years, these other lineages have become extinct, leaving only *Dermochelys*, a genus that appears nowhere in the fossil record. Where did these hot-blooded leatherbacks of the late Cretaceous period come from? There was nothing else like them then, just as there is nothing like them now.

Survival

One thing we can say for sure about leatherbacks is that they are highly endangered. Surveys of nesting beaches in 1980 suggested a world population of 115,000 adult nesting females. A similar survey in 1995 calculated about 34,500. Some of the difference may lie in survey methods or natural fluctuations in nesting activity, but for a number of regions, the decline is very real. Of the 28 known major nesting beaches, the number of females coming ashore has declined noticeably on 10.

These figures do not include major nesting areas, such as India where the turtles have been extirpated. A beach in Malaysia that had more than 3,000 nesting females in the late 1960s had but two by 1994. And hunting of leatherbacks still occurs in Indonesia. The ancient ritual hunts now feature 21st-century equipment that eliminates any competitive edge the turtles may have had. In addition to the meat, the oil is an important product for the villagers.

One saving feature is that after feeding on jellyfish, the leatherback stores the stinging toxins and becomes poisonous if eaten. Yet all of the turtle's special adaptations help little when it comes to the harvesting of eggs by subsistence hunters; drowning by trawls, nets and lobster and crab pots; slicing from ships' propellers; choking on floating plastic; and development on prime nesting beaches.

Off the coast of the United States, where the turtles are protected by law, all mortality is incidental. Yet more than 100 leatherbacks float ashore each year with fatal wounds from ropes, nets and propellers. At least that many again are killed but do not wash ashore.

Programs now protect some nesting beaches, and education may curtail much of the incidental mortality. Protecting the hatchlings for their first day alone doubles their chances of survival to adulthood. Because of their size, these turtles can produce large and multiple clutches. In some populations clutch size averages 100 eggs, and a few females have been shown to produce as many as 11 clutches in a single season. In French Guiana, where the activity of researchers has deterred illegal taking of eggs by locals, the number of nesting females increased about fivefold in a 10-year period.

Survival in the wild is the leatherback's only hope. Most of the great animals of the earth can be seen in zoos or public aquariums. Not so the leatherback, which seldom survives in captivity. The record longevity for a captive is just over three years, and they rarely survive more than a few months. In captivity leatherbacks spend every moment of the day and night swimming full speed into the sides of their containers. Resulting scrapes and bruises never heal, and infections take hold.

Because they present unusual problems to preservationists, leatherbacks are seldom exhibited in museums. The flesh and skin, and even the skeleton, are saturated with oil. Mounted specimens drip oil for decades, and eventually the remains look like misshapen, black turtle jerky. Today, a number of museums have produced fiberglass models that look, for all purposes, like the real turtle. The N.C. Museum of Natural Sciences in Raleigh is the only place I know where you can view an actual leatherback. The female leatherback still drips grease, despite its collection date of 1897. I can find no record of how the animal was prepared, but despite showing its age, it has held up rather well and remains one of the museum's most interesting specimens. If you look closely, you can still see a few grease spots.

As scientists learn more about living things, patterns should emerge. Eventually an understanding of how all these leatherback facts fit together should become apparent. But right now, a lot of things about leatherbacks don't seem to jell. Vocal and scaleless, this fast-growing, fast-swimming and deep-diving turtle shatters nearly all our generalized concepts of reptiles. To some of us, the sea means mysteries of the deep, a Jules Verne fantasy. To others, it means man-eating sharks, sea monsters and other real or mythical beasts. For me, just knowing about the existence of gigantic, oily, jellyfish-stalking leatherbacks, with their hearts pumping warm blood, makes the sea seem wider and wilder. ⊠

Long-Distance Travelers

Leatherbacks migrate thousands of miles each year from their nesting grounds ● on the warm beaches of South America and the Caribbean to the frigid waters of the North Atlantic.

September doves

Grab a comfortable seat, a cool drink and plenty of shells. It's time for dove season.

written and photographed by F. Eugene Hester

The opening of dove season in September is a special time. Maybe that's because it signals the opening of the autumn hunting season. Or maybe it is special because of the social nature of a dove hunt in which friends gather to share a comradeship in the field. Perhaps other things are important, too, such as the challenge of hitting a passing dove. It looks so simple and easy, but the number of missed shots provides ample evidence of the skill needed to bring down a dove.

When I was growing up decades ago in a rural part of North Carolina, finding places to hunt doves was not difficult. My father was a country doctor, making house calls nearly every day. As he drove the country roads, he would look for doves on power lines or dead trees, or simply flying over fields or across the road.

My dad knew all the landowners for miles around and had no difficulty in getting us permission to hunt the best fields. Back then, too, there was not much competition from other hunters.

Some fields were especially productive for us year after year. They were usually the large ones under those tall power lines, especially near the crest of a hill.

Waste grain and abundant weed seeds were more available back then. But as herbicides became widely used to control weeds, and farming practices became more mechanized, less food was available for doves.

Doves tended to concentrate in those few fields where food became abundant, usually in a way incidental to the harvest of a crop. Late-harvested wheat fields or even tobacco fields with a lot of weed seeds on bare ground attracted doves. But even more important were the cornfields in which the corn was cut early for silage. The waste corn kernels plus the exposed weed seeds acted as dove magnets. These fields seemed to draw every dove from miles around.

They also served as magnets for dove hunters, and over time, the competition for these fields resulted in the fields being leased or landowners charging a fee for hunting by the day.

Soon it became apparent that the only good dove hunting would be where food was grown intentionally or unintentionally for doves.

Sowing for Doves

One year Ralph Wear of Salisbury and his father obtained permission to hunt a field. But soon after they took a position, another hunter shot at a low-flying dove, peppering Ralph and his dad with birdshot. They had seen the other hunter aiming at the low bird and had turned their backs, avoiding serious injury. After a few choice words, they left without ever firing their guns.

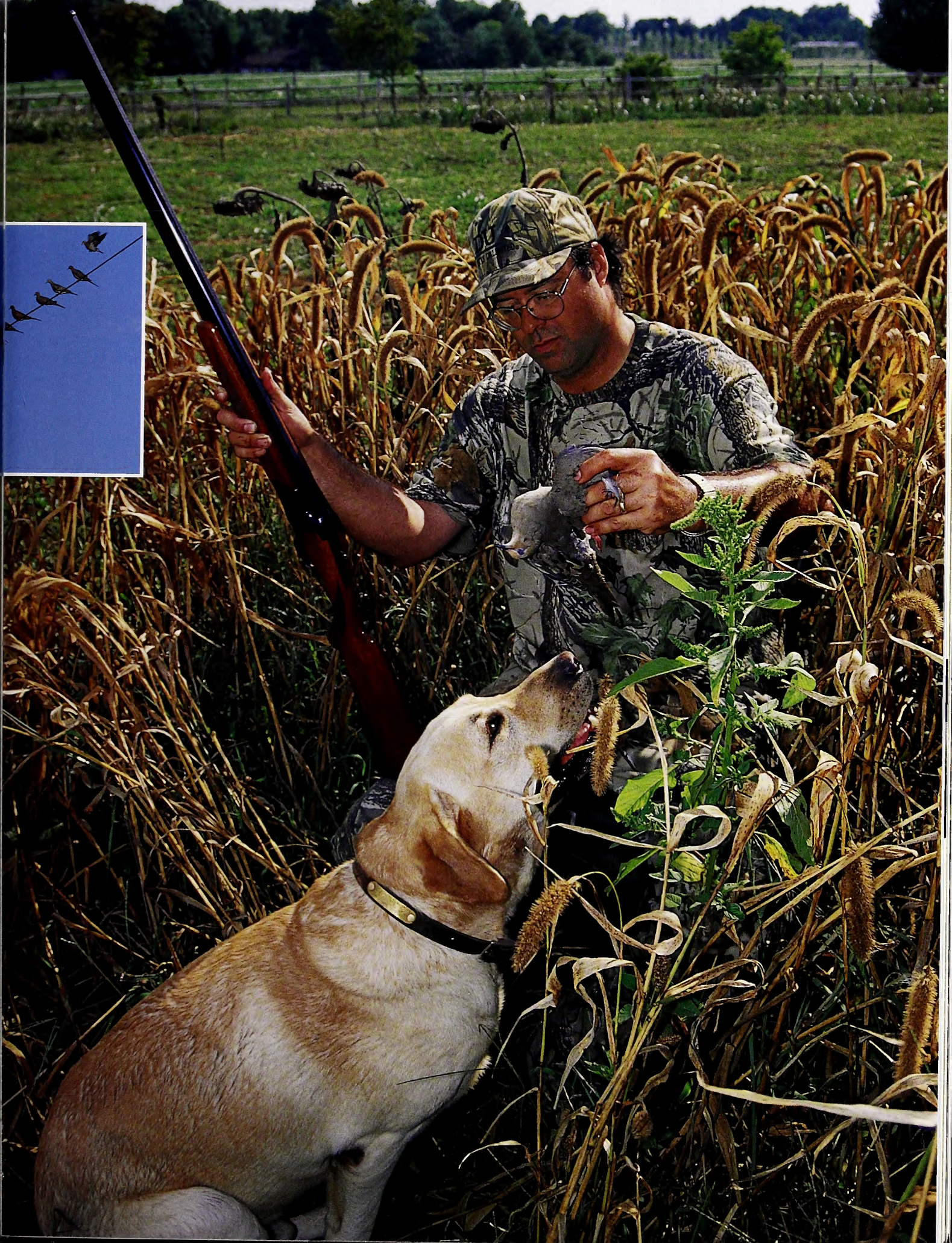
Soon afterward, Ralph and his dad decided to create their own dove fields. On their two farms, they had fields that could be planted and harvested to provide food for doves.

On each of his farms, Ralph plants about 5 acres of crops in some combination of corn, milo, millet and black-oil sunflowers. He has tried other potential crops but has selected these as the best ones for his soils and management conditions.

Managing crops for doves in such an intensive way is not inexpensive. It costs somewhere between $100 and $200 per acre, and that doesn't include costs for land or equipment and a lot of the labor. Ralph's hunting buddies help pay these costs.

"My first decision was what to plant," Ralph said. He had heard that millet was one of the better crops for doves, so he planted four or five types to see which would be most appealing to the birds. German R, called foxtail, worked best under his field's conditions, growing well and producing a lot of seeds. White proso millet also did well. It produced a lot less seed than German R but

***Ralph Wear and** his yellow lab, Rock, hunt mourning doves in a field specially planted to attract these game birds. Above, overhead wires provide good perches—and good pass shooting for the dove hunter who stakes them out.*



grew faster, making it especially useful if he got a late start in planting. Ralph added black-oil sunflower seeds to the millet. "It is a good mixture and makes a good combination crop," he said. "If you have a drought, the millet will grow even if the sunflowers do not." Sunflower seeds are also attractive to many other birds, especially goldfinches, which can consume as much as one-third of the crop while it is still standing.

Ralph has learned to plant deep. "I find the deeper the seed bed, the better success you will have with the sunflower crop," he said. "I plow a field as deep as possible, then disk it until the clods are almost gone. I broadcast 15 to 20 pounds of each [millet and sunflower] per acre. Then I disk the field again to cover the seeds."

Experience has also taught him to buy certified seed. "It will reduce the number of weeds and also give you good germination rates," he said. "When I started, I did not use certified seeds. That can be a nightmare. You can get all kinds of weeds in a hurry, and some of them are very difficult to control.

"When I detect weeds, I like to go after them with a hand sprayer to get them under control early. If you don't do that, you will have twice as many the next year," he said.

Johnson grass was especially troublesome. "Every year I would have more of it in my fields. I tried disking it, but that just made it worse," he said.

On those fields where the Johnson grass was worst, he planted corn engineered to be compatible with Roundup herbicide. Spraying three times in the summer greatly reduced the weeds without harming the corn.

Ralph plants the crops in mid-May so they will be mature before opening day.

"I start harvesting about two or three weeks before the dove season starts," he said. "I usually bush-hog a few rows of the crop at a time, so it scatters the seeds and cuts the vegetation low to the ground. Doves like the open area and the easily available seeds on the ground. I harvest a little more about every three days. That way, I provide more seeds as soon as the previous ones are eaten."

Both fields provide good dove hunting. "In most years we have enough doves for all of the 20 hunters to get a limit when they hunt the two fields on opening day," he said. "After that, I hunt the fields once or twice a week, but with fewer hunters. In some years I have gotten my limit each Saturday during the early season."

For me, the conclusion of a dove hunt is not when the bag limit is reached. It is when I sit down to one of Ralph's dove pies (see recipe, facing page) or to a plate of fried doves with biscuits and gravy. ⊠

Doves make an ideal quarry for a first hunt, but there are tricks to bagging them.

Hunting Basics

For a lot of reasons, doves are great as first game animals for new hunters. The hunting usually takes place in mild weather, travel is simple, and action is usually fast.

Even in fair weather and with naive doves, several shots are needed for the average hunter to bag a bird. With a good tailwind and a little experience by the dove, hitting it becomes even more difficult, posing a challenge for even a serious marksman.

Conditions can be made more favorable by locating a position adjacent to a power line or dead tree that doves use for perching before flying down to feed. The best place I have ever seen is where two power lines crossed at right angles on a hill over crops planted for doves. The person in that position is almost guaranteed to be the first one to get a limit of doves. Then another hunter moves to that coveted spot.

Finding doves that fall in weeds or standing crops can be

A bumper crop of *seed-bearing plants such as millet and sunflowers can yield good dove hunting, but doves prefer some bare ground for feeding.*

difficult. A good retriever works wonders in finding them or in following and catching crippled birds. Without a dog, it becomes essential to watch the dove as it falls and remember exactly where it fell. Marking it visually in a line with a certain tree or bush helps; and if two hunters in different positions see where it falls, that makes locating it even easier.

Attempting to kill a second bird from a flock without marking the first one down makes finding it that much harder.

Dove Pie

4 deep-dish pie shells
1 stick butter or margarine, divided
2 tablespoons flour
1 teaspoon salt
1/4 teaspoon pepper
1/4 teaspoon thyme
1/2 cup chicken broth
1/2 cup Half-and-Half
2 cups dove breasts
1 can green peas (15 oz.), drained
1 can diced carrots (14.5 oz.), drained
1 jar pearl onions (15 oz.), drained

Boil dove breasts 10 minutes and cube. Heat oven to 425 degrees. Melt 2 tablespoons butter in large saucepan over low heat. Blend in flour, salt, pepper and thyme. Cook over low heat until mixture is smooth and bubbly. Remove from heat. Stir in chicken broth and Half-and-Half. Heat to boiling, stirring constantly. Boil and stir 1 minute. Stir in cubed dove and vegetables. Pour into two pie shells. Cut the remaining butter into pats and place on top of the pies. Cover with the other two pie shells and seal edges. Cover the outer edge of the crust with aluminum foil to keep it from burning. Bake 35 to 40 minutes or until golden brown.

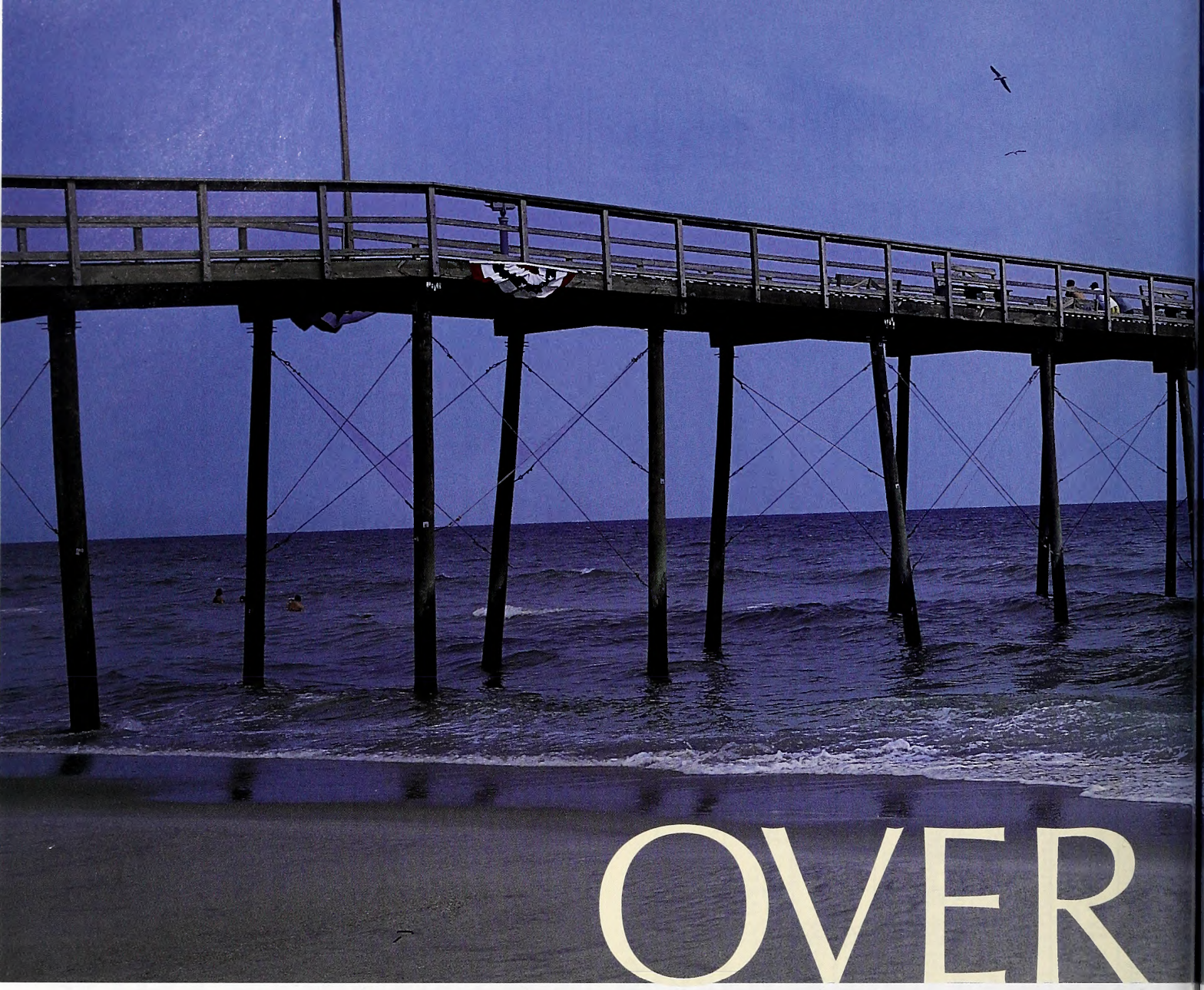
—Ralph Wear

NORTH CAROLINA
Hunting Seasons 2001–2002

Species	Hunting Season	Daily Limit	Possession	Season
CROW	Thurs., Fri., Sat. of each week from June 1 through the last day of February plus Labor Day and Christmas Day (Seasons shown are valid through June 30, 2002.)	No restriction		
DOVE	Sept. 1–Oct. 6 (noon through sunset from Sept. 1 through Sept. 7; thereafter, shooting hours are ½ hour before sunrise to sunset.) Nov. 19–Nov. 24 Dec. 19–Jan. 15 (Shooting hours are from ½ hour before sunrise until sunset during Nov. 19–24 & Dec. 19–Jan. 15 seasons.)	12	24	None
RAILS, MOORHENS & GALLINULES				
Moorhen and Gallinule	Sept. 1–Nov. 9	15	30	None
Clapper Rail, King Rail	Sept. 1–Nov. 9	15	30	None
Sora Rail, Virginia Rail	Sept. 1–Nov. 9	25	25	None
CANADA GEESE	Sept. 4–Sept. 29 (Except N.E. counties)[1] Sept. 1–Sept. 20 (N.E. counties)[1]	5 *(except for Dare and Currituck counties where limit is 2)*	10 *(except for Dare and Currituck where limit is 4)*	None
MIGRATORY WATERFOWL	Federal regulations may be obtained by contacting a license agent or by calling toll free 1-800-675-0263 after Labor Day.			
DEER		2	6[2]	6[2]
Bow and Arrow	Sept. 8–Oct. 5 (Eastern)[3] Sept. 10–Oct. 6 and Oct. 15 – Nov. 17 (Western)[3] Sept. 8– Nov. 2 (Central)[3] Sept. 8– Nov. 9 (Northwestern)			
Muzzleloading	Oct. 6–Oct. 12 (Eastern)[3] Oct. 8–Oct. 13 (Western) Nov. 3–Nov. 9 (Central)[3] Nov. 10–Nov. 16 (Northwestern)			
Gun	Oct. 13–Jan. 1 (Eastern)[3] Nov. 19–Dec. 8 (Western)[3] Nov. 10–Jan. 1 (Central)[3]			

Special, Either Sex	*Trapping Regulations Digest*			
BLACK BEAR	See *Regulations Digest*	1	1	1
WILD BOAR	Oct. 15 – Nov. 17 and Dec. 10–Jan. 1	1	1	2
RED & GRAY SQUIRREL	Oct. 15 – Jan. 31	8[4]	16	75
FOX SQUIRREL	Oct. 15 – Dec. 31 (Only in 20 counties; season closed elsewhere; see *Regulations Digest*)	1[4]	2	10
COMMON SNIPE	Nov. 14 – Feb. 28	8	16	None
QUAIL	Nov. 17 – Feb. 28	6	12	None
RUFFED GROUSE	Oct. 15 – Feb. 28	3	6	30
RACCOON & OPOSSUM	Oct. 15 (sunrise) – Feb. 28	No restriction on opossum See *Regulations Digest* for bag limits on raccoon		
RABBIT Rabbit—Box Trapping	Nov. 17 – Feb. 28 Nov. 17 – Feb. 28	5	10	75
PHEASANT—Non-native Male Pheasant Only	Nov. 17 – Feb. 1	3	6	30
WOODCOCK	Dec. 17 – Jan. 15	3	6	None
BOBCAT	Oct. 15 – Feb. 28[5]	No restriction		
FOX	See *Regulations Digest*			
GROUNDHOG	No closed season or bag limits			
COYOTE	No closed season or bag limits			
NUTRIA	No closed season or bag limits (except Currituck County, see *Regulations Digest*)			
WILD TURKEY Bearded Turkey Only	April 13–May 11[6]	1	2	2

[1] Counties in N.E. Season are: Bertie, Camden, Chowan, Currituck, Dare, Hyde, Pasquotank, Perquimans, Tyrrell and Washington.
[2] See *Regulations Digest* for buck bag limits.
[3] See *2001–2002 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 1722 Mail Service Center, Raleigh, N.C. 27699-1722.
[4] Total limit of 8 squirrels per day of which one can be a fox squirrel.
[5] The bobcat season is closed in the Harmon Den and Sherwood bear sanctuaries in Haywood County.
[6] See *2001–2002 Regulations Digest* for counties open to turkey hunting.



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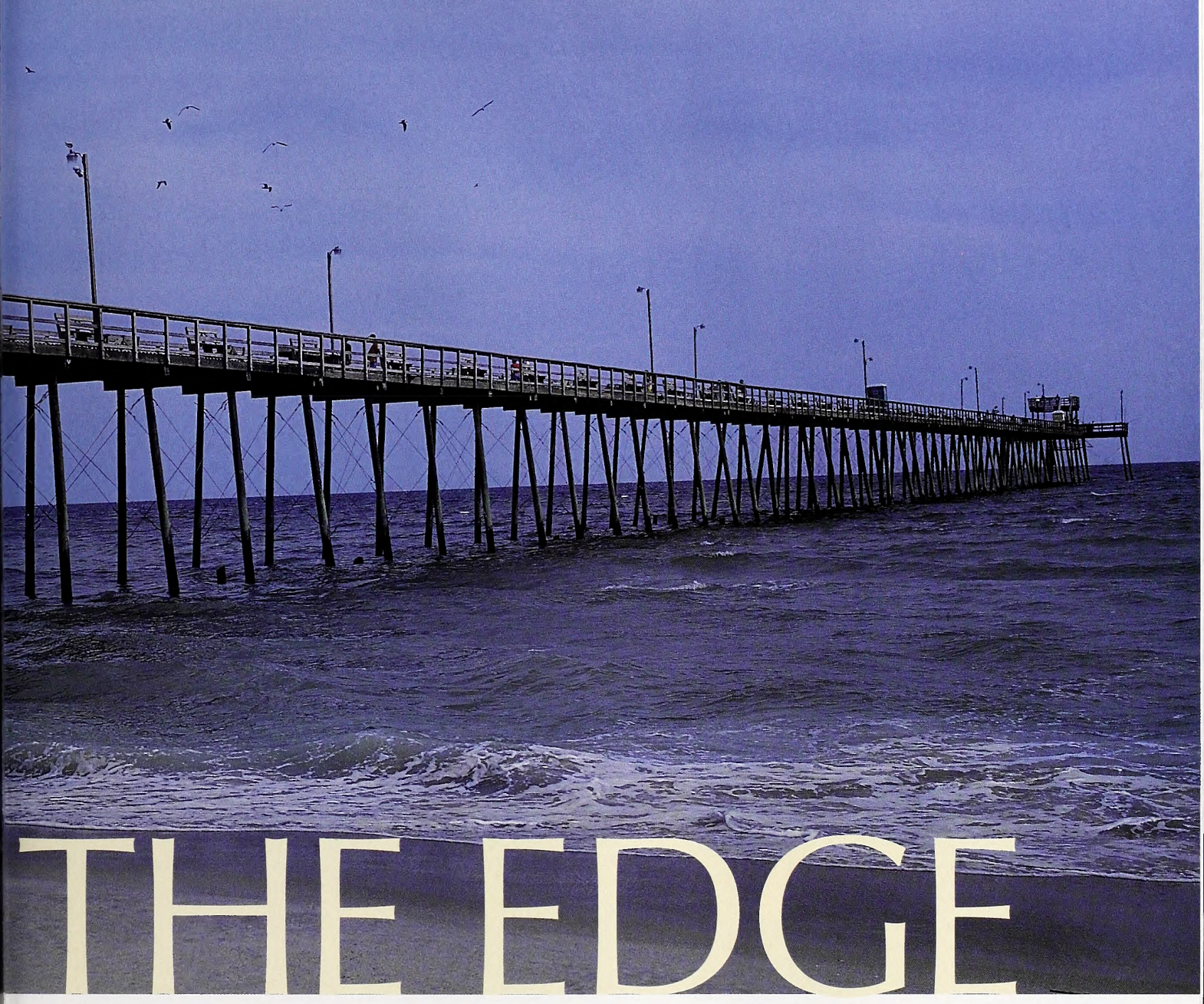


THE EDGE

WRITTEN BY JOE MALAT

PHOTOGRAPHED BY SCOTT TAYLOR

Anglers and fish may come and go, but the allure of pier fishing remains.

Sunrise was just a promise in the east, a sliver of light on the horizon. About 20 anglers were scattered near the end of the pier. Some were sipping coffee and chatting; others were lazily casting lures into the darkness of a calm ocean. I plopped my tackle bag down on the planks, nestled my fishing rod into a notch on the pier railing and greeted a group of coffee drinkers. "No sense wearing out your casting arm; let someone else catch the first one," a voice offered. I laughed and joined the group, but my coffee went cold before I could finish the last sip.

"Fish on, nice mackerel!" came a cry from the southeast corner of the pier.

"I'm in," hollered another angler from the opposite side. Before those two fish hit the pier deck, 15 lures of various colors were flying through the air. Instantly half of the rods bent double, and the predawn air was electric with a first-light feeding frenzy of Spanish mackerel and bluefish.

The anglers, seasons and fish come and go from year to year, but scenes like this occur with regularity at all of the North Carolina fishing piers jutting into the Atlantic Ocean from Kitty Hawk to Sunset Beach.

The experience of fishing from a pier appeals to a tremendous number of fishermen for a variety of reasons. Those weathered, wooden structures offer a blend of both surf and boat fishing. They provide anglers with opportunities to cast their lines into deep water, far beyond the efforts of the world's best distance surfcasters, but without the slightest fear of seasickness.

Big cobia, king mackerel, tarpon, amberjacks and sharks swim and forage for food

JOE MALAT

***An angler casts for** Spanish mackerel and bluefish at sunrise on the Outer Banks. Early morning and late evening are both excellent times to try for these voracious species from any of North Carolina's piers.*

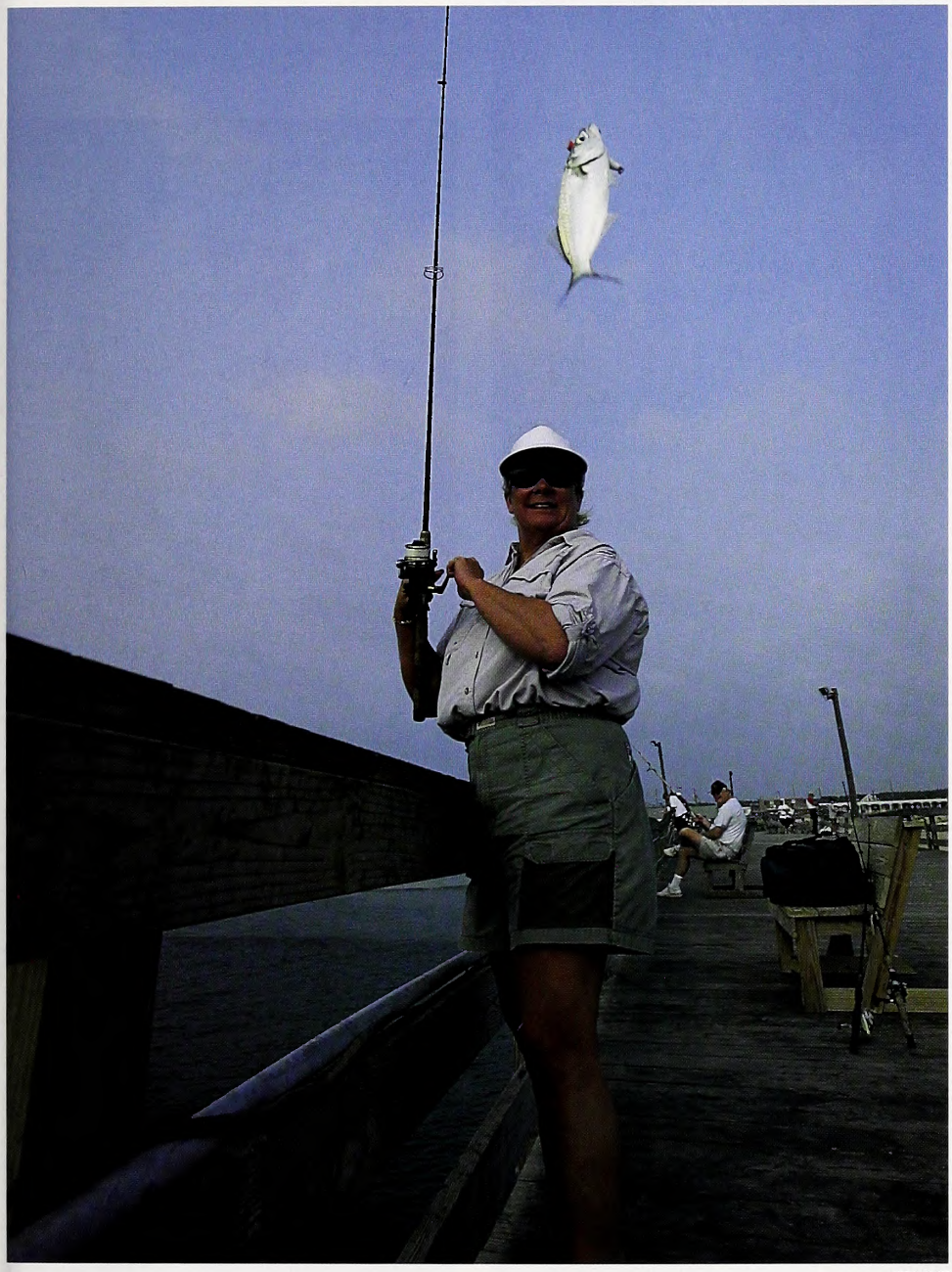
just beyond the crashing waves and shallows of the surf zone. These fish are the big game of the pier-fishing world; some weigh more than 100 pounds.

To catch such monster fish, anglers often employ specialized tackle and techniques. A system of two rods and live baits is typically used. One rod is an "anchor line," used only to cast a heavy lead sinker, which buries in the sand, as far as the fisherman can hurl it. The other rod delivers a frisky live bait, such as a small bluefish, pinfish, spot, croaker or menhaden, down to the water. This line is pinned to the anchor line with a breakaway clip that releases from the anchor on the strike. The fighting rods are similar to outfits that might be found on a boat: large reels with mammoth line capacity and smooth drags to allow a jumbo "smoker" king to rip off a hundred yards of line on its blistering first run. This is big-game fishing on a budget.

But that's too involved and way too much work for me. I'm one of those guys who never fishes for the big, tackle-busting jumbos. Maybe it's my advancing age, but I really don't want to be attached to a fish for the better part of an hour while we take turns trying to decide which one of us will be the first to surrender.

I like the small stuff, such as speckled trout, Spanish mackerel, bluefish, puppy drum, flounder, sea mullet and a variety of the diminutive "bottom fish," so named because they travel in fairly large schools and feed close to the bottom. But these fish are far from miniatures. There's absolutely nothing puny about the fight of a 3-pound speckled trout, bluefish or Spanish mackerel.

Tackle is basic. I like to use a medium to lightweight spinning rod, about 7 feet long, matched to a reel filled with 12-pound test line. The combo is perfect for fishing with natural baits or casting artificial lures.



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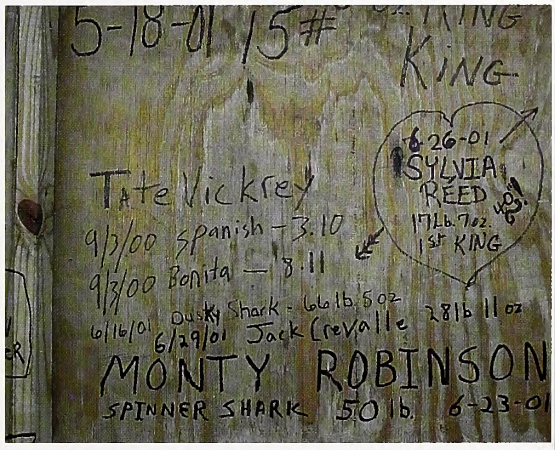


Jigging lures (top) *can be great for catching fast-swimming predators including bluefish (left) on light tackle from a pier. Heavier tackle and live bait are needed to take much larger predators including king mackerel. Memorable catches are recorded (above) on the Long Beach Pier itself in Brunswick County.*

The bottom feeders prefer bits of lively bloodworms, fresh shrimp or tiny chunks of cut squid. Light wire hooks, Nos. 2 to 4, rigged on the universally popular two-hook bottom rig are perfect for these small-mouthed fish. A small pyramid sinker that's just heavy enough to keep the rig in one place on the bottom completes the setup. Strips of fresh mullet are the ticket for bluefish, speckled trout or puppy drum. During the fall, as these fish make their annual southward migration along the North Carolina coast, small finger mullets are the bait of choice. The predators are literally right on their tails!

The big-game guys cluster around the ends of the piers, trying to get their baits as far out as possible, while the smaller fish and the anglers who seek them can be found along the full length of most structures. I frequently take a tip from my surfcasting cohorts by fishing close to the beach on the edge of the sandbars, or in the slightly deeper water of the pockets and sloughs between the bars and the beach. That's where the food is. Mullets, silversides, sandworms and mole crabs are constantly being churned about by the breaking waves.

Bait is great, but some fish are best taken on artificial lures. Spanish mackerel and bluefish, both fast-swimming and aggressive predators, will frequently engage in a feeding frenzy only a few feet from the pier. That's the time to offer an artificial lure, and the favorite along the Tar Heel coast for blues and macks is a jigging lure. It casts far, sinks fast and covers the entire water column on the retrieve. The lure looks like a short piece of plastic tubing armed with two gold-finished treble hooks, with an angled lead head at the front end. Lure colors may vary according to water clarity and ocean conditions, but red heads with fluorescent green or white bodies are proven fish-catchers.

Both blues and macks have sharp teeth, and to eliminate lost tackle, some fishermen will put a short piece of wire in front of their lures. The fish, however, can easily see the wire when the water is ultraclear. Six inches of 50-pound test monofilament leader is nearly invisible and will draw more strikes from these keen-eyed predators.

***Rebuilt after a spate** of recent hurricanes, many of North Carolina's piers provide a variety of conveniences including fish-cleaning tables with running water, observation decks, rain shelters and plenty of benches. Some visitors choose to stretch out and read. Serious pier anglers sport custom-made carts to wheel their equipment over the pier planks.*

A walk down any North Carolina fishing pier will reveal that there's more to the experience than just a rod, a reel and a few lures. Just as boaters enjoy outfitting their favorite craft, and hard-core surfcasters transform an ordinary-looking SUV into a mobile beach buggy, pier fishermen have devised unique ways to get their gear from one end of the pier to the other.

Some, such as myself, prefer the minimalist approach. I usually carry one rod and a tackle bag that I can sling over my shoulder. If I plan to use fresh bait or hope to take home some fish for dinner, a small cooler carried in one hand will complete my gear requirements. I like to travel light.

Others bring everything but the kitchen sink, dragging or pushing homemade carts that are marvels of angling ingenuity. Modified shopping carts, wheelbarrows and classy-

***Piers are a great way** to introduce children to fishing. Take a youngster onto a pier when the fish are running, and you will likely have a fishing partner for life.*

JOE MALAT

looking custom-made aluminum carts, sporting vertical rod holders and deluxe bait-cutting boards, are wheeled over the pier planks.

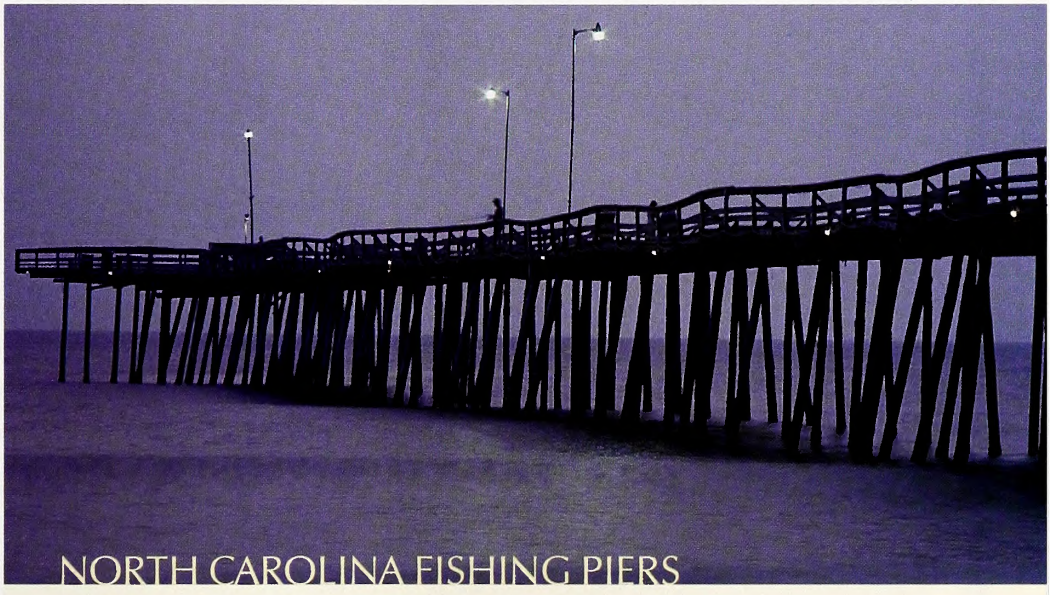
Thirty years ago, my dad and I used a neat Radio Flyer wagon with wooden side rails to haul our gear. I bought it for him as a present, and I believe he was the only 55-year-old man I've ever known to get a new wagon for Christmas.

Piers also offer an array of creature comforts. Most are equipped with tackle shops that offer fresh bait, tackle and rod-and-reel rentals. Snacks, cold drinks and hot coffee are on the minimum side of food choices, and plenty of the piers feature full-scale restaurants. Some will even cook your own fresh-caught fish, served with a side order of coleslaw and French fries.

There are also fish-cleaning tables with running water, benches, rain shelters and lights for fishing at night. During the fishing season, many piers are open 24 hours a day. Piers offer safe, easy accessibility for wheelchairs.

Piers are also a great way to introduce young people to fishing. Casting is not necessary, and bathrooms and food are but a few steps away. Believe me, during a child's fishing adventure, all of these things are just as important as the actual fishing. Take a youngster onto a pier when the spot are being caught two at a time, and you will have a fishing partner for life.

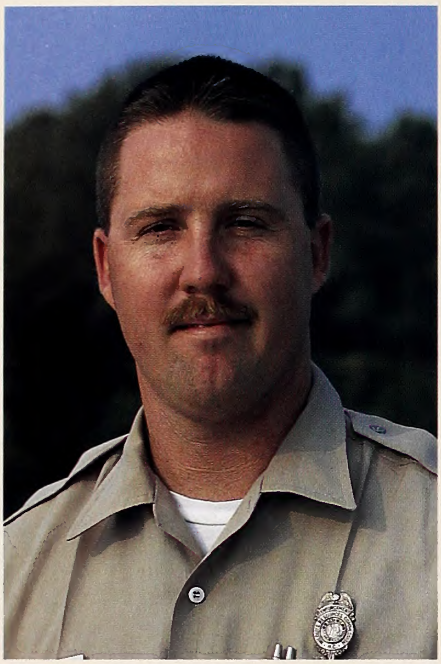
That's what my dad did for me. When I was 5 years old, I caught my first fish from a small wooden pier on a saltwater river in Maryland, and I slowly graduated to the ocean piers of several states from Maryland to Florida. That first fish carved a special place in my angling heart. Standing on a pier high above the breakers, there is no better place along the Atlantic coast for pier fishing than North Carolina. ⊠



NORTH CAROLINA FISHING PIERS

Avalon Pier	Kill Devil Hills	(252) 441-7494	www.avalonpier.com
Bogue Inlet Pier	Emerald Isle	(252) 354-2919	www.bogueinletpier.com
Carolina Beach Pier	Carolina Beach	(910) 458-5518	
Hatteras Island Pier	Rodanthe	(252) 987-2323	www.hatterasislandresort.com
Holden Beach Pier	Holden Beach	(910) 842-6483	
Iron Steamer Pier	Atlantic Beach	(252) 247-4213	www.ironsteamer.com
Jennette's Pier	Nags Head	(252) 441-6116	www.jennettespier.com
Jolly Roger Pier	Topsail Beach	(910) 328-4616	
Kitty Hawk Pier	Kitty Hawk	(252) 261-2772	
Kure Beach Pier	Kure Beach	(910) 458-5524	www.kurebeachfishingpier.com
Long Beach Pier	Long Beach	(910) 278-5962	www.longbeachpier.com
Nags Head Pier	Nags Head	(252) 441-5141	www.nagsheadpier.com
Oceanana Pier	Atlantic Beach	(252) 726-0863	
Oceancrest Pier	Long Beach	(910) 278-6674	
Ocean Isle Pier	Ocean Isle Beach	(910) 579-6873	
Outer Banks Pier	Nags Head	(252) 441-5740	www.fishingunlimited.net
Seaview Pier	Topsail Beach	(910) 328-3172	
Sportsman's Pier	Atlantic Beach	(252) 726-3176	www.sportsmanspier.com
Sunset Beach Pier	Sunset Beach	(910) 579-6630	
Surf City Pier	Surf City	(910) 328-3521	
Triple S Pier	Atlantic Beach	(252) 726-4170	www.triplesresort.com
Yaupon Beach Pier	Yaupon Beach	(910) 278-9400	

MEET ENFORCEMENT OFFICER Mike Edmisten



written by Brad Deen
photographed by Melissa McGaw

Bootprints begin where the knobby tread of a four-wheeler ends. They show where one hunter dropped his buddy off, remarks Mike Edmisten, an enforcement officer for the N.C. Wildlife Resources Commission.

The bootprints lead into the woods, but not out. It rained two nights ago. These tracks should be fresh.

An outdoorsman all his life, Edmisten would rather be hunting turkeys himself. But his job requires him to work when others are at play.

The boot tracks lead uphill, and the muddy path gives way to grass. Edmisten considers for a moment and then plots a direction.

He doesn't know whom he's tracking. Maybe it's a **poacher**.

"The vast majority of hunters follow the law. They do what they're supposed to," he explains later. "I'd say 10 percent of the people are doing 90 percent of the violations. I've caught the same person as many as three times."

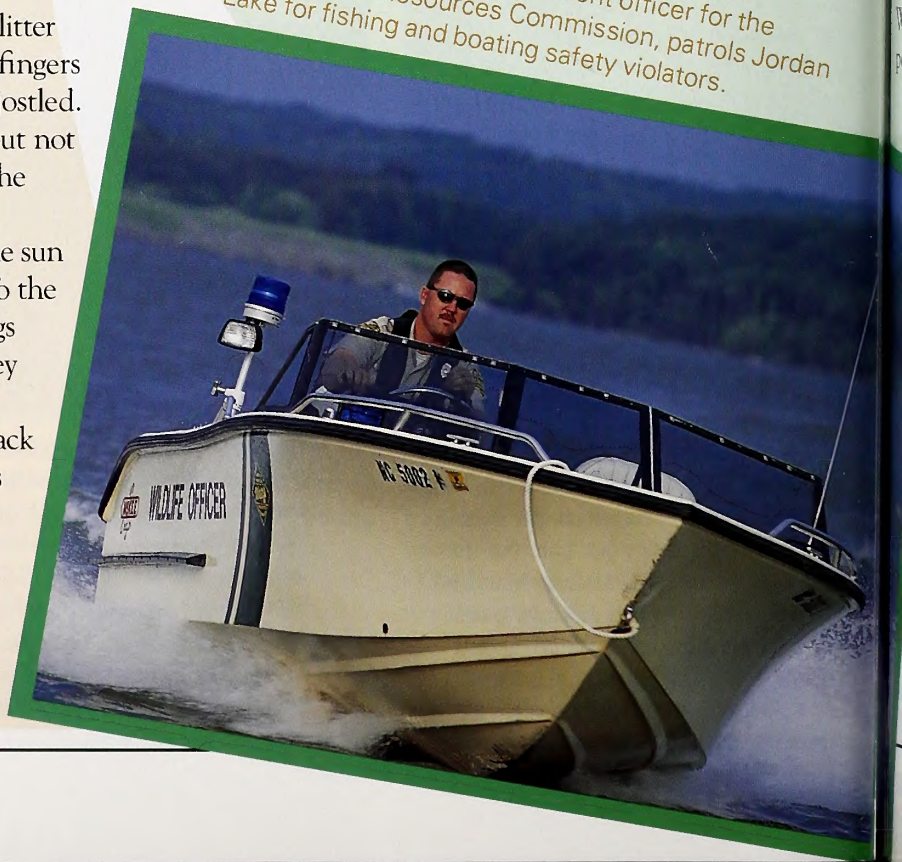
Those violators endanger the hunting opportunities for everyone by trespassing, hunting or fishing without a license or exceeding their **bag limits**.

He stops. Small white blackberry blossoms litter an envelope-sized patch of ground. Edmisten fingers the thorny vine from which the blooms were jostled. Something passed this way—something big, but not in a headlong hurry. And that was recently. The fallen petals are still white.

His steps fall softer as he presses deeper. The sun has burned off the dew, and it's getting hot. To the southwest, a sound like hysterical laughter rings through the pines and maples. It's a tom turkey announcing itself.

Edmisten matches the tom's call. But the lack of a reply other than his confirms that there's no one else around. Either the tracks he's followed are old, or the hunter left by another direction.

Sometimes it pans out, and sometimes it doesn't. But he knows this spot now. If poachers come here, he'll get them eventually.



Mike Edmisten, an enforcement officer for the N.C. Wildlife Resources Commission, patrols Jordan Lake for fishing and boating safety violators.

Not Just Wardens

Some people call Edmisten and his 200 fellow wildlife enforcement officers "game wardens," but that's not quite accurate. Their job is much broader than making sure hunters and fishermen follow the rules.

Wildlife enforcement officers teach hunter safety classes, which are required for a hunting license in North Carolina. The classes cover hunting rules and safety principles, such as wearing bright hunter orange so that another hunter won't mistake you for a game animal.

Wildlife officers spend most of their time outside. They search for hunters, campers or hikers who are missing. They are often the first to find someone who's been injured or become sick while outdoors.

Among the specialized tools wildlife officers employ are night-vision scopes and decoy deer, which fool hunters who dangerously shoot from a car or truck.

Officers also serve as a police force patrolling North Carolina's wild and semi-wild places. They protect people and property at state-maintained boat ramps, for instance. The trucks and cars of boaters who are out on the water can tempt thieves and vandals. Wildlife officers are armed, like police officers, and can arrest people they suspect of breaking the law—any law.

"It takes people off guard a lot of times," Edmisten said. "They think we're just out here to check licenses."

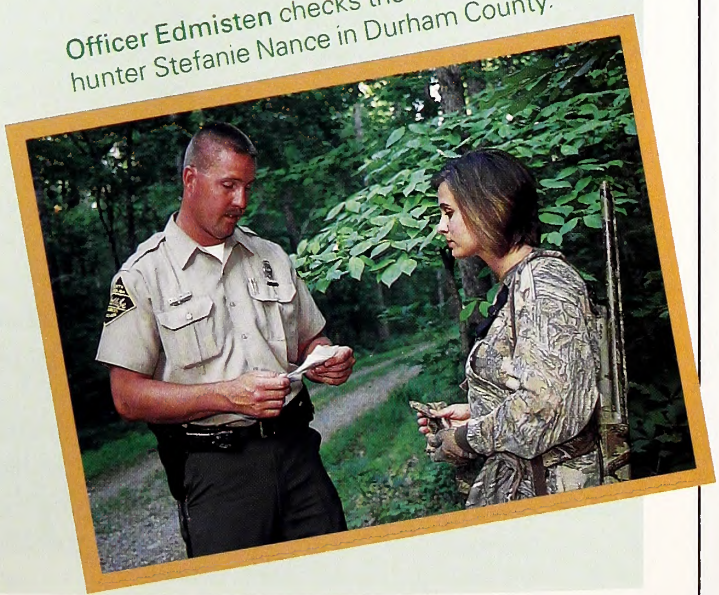
Officers are also on constant lookout for drivers who have been drinking alcohol, either on land or on the water.

In fact, boating safety is one of the most important duties wildlife officers have. Patrolling Jordan Lake in Chatham County on a recent weekend, Edmisten checked every boat—bass, pleasure and flat-bottomed skiff—to make sure everyone on board had a **PFD**, or personal flotation device. Longer boats must also carry a **fire extinguisher** and an extra flotation cushion.

On the job six years now, Edmisten knew what to expect even before he joined the force. His grandfather was a wildlife enforcement officer, a high-ranking captain.

"I always loved hearing his stories," he said.

Officer Edmisten checks the license of turkey hunter Stefanie Nance in Durham County.



Airplanes provide wildlife officers an eye in the sky for finding lawbreakers.

TOOLS OF THE TRADE

The Wildlife Commission makes sure its officers have the equipment they need to do their jobs.

Officers drive four-wheel-drive trucks, allowing them to go over rougher terrain than a regular car or truck could handle. The trucks are equipped, like police cars, with sirens, flashing blue lights and **two-way radios**. Their boats are also outfitted with lights and radios.

The communications equipment is some of the most important a wildlife officer has. Often, an officer in the field works alone.

"If you need some backup, there's nobody there with you," Edmisten said.

The job also requires a lot of night work, especially in the summer and fall. In warm weather, many boaters and fishermen prefer to be on the water in the cooler, less crowded evenings and nights. And during deer season, some hunters illegally and dangerously hunt at night, so wildlife officers are in the woods trying to catch them.

To make the night work easier, officers have special night-vision scopes and goggles, which allow them to see in the dark. Wildlife enforcement officers also rely on airplanes for night work, particularly during deer season. Airborne officers search for lights in the woods, indicating someone is "shining" deer.

Another tool of the wildlife enforcement trade is the deer decoy, which looks like a real deer, including antlers and real fur. Officers use the decoy especially to find people who hunt from their cars or trucks, which is extremely dangerous to anyone who may be nearby. An officer positions the decoy deer near the road, usually just on the edge of the woods, then waits for a drive-by hunter.

To combat another illegal practice, **baiting** game, officers have a new, high-tech weapon. Using satellites and **GPS** technology, an officer who encounters a bait pile in the woods can mark it. The hand-held unit is accurate to within 6 feet, making it easy for the officer to return later, in search of the person who left the bait.

A hunter and fisherman all his life, Edmisten sees the job he and his fellow wildlife officers do as protection. They protect the safety and the property of people who enjoy the outdoors, and they protect our fish and wildlife—some of our most valuable natural resources.

WHAT DOES IT MEAN?

poacher: a person who hunts or fishes illegally, usually by trespassing, exceeding game limits, hunting or fishing out of season or failing to obtain a license

bag limit: the highest number of a game animal that a hunter may legally kill or possess in a given time, such as one turkey per day or two per season; in fishing, known as a creel limit

PFD: a buoyant life preserver carried and worn in boats for safety

fire extinguisher: a device that sprays chemicals to put out fires

two-way radios: devices that allow people to talk to each other over long distances

baiting: leaving food for animals in the hope of attracting them to a spot for easier hunting

GPS: or Global Positioning System, a system that uses computers and satellites to determine an exact location on the earth

Officer Edmisten marks an illegal bait pile for turkeys with a GPS locator to find it again—and maybe the poacher who set out the bait.

IT'S WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Which Niche? teaches students to define ecological niches by comparing them with careers in their community.

Wildlife Research: teaches students to name and describe three wildlife occupations.

READ AND FIND OUT

- *Wildlife Wars: The Life and Times of a Fish and Game Warden* by Terry Grosz, Johnson Books, 1999.
- *Everglades Lawmen: True Stories of Game Wardens in the Glades* by Jim Huffstodt and James T. Huffstodt, Pineapple Press Inc., 2000.
- *Tough Customers* by Terry Hodges, T & C Books, 1994.
- *Nature's Keeper* by Michael Tobias, Wiley, John & Sons Inc., 1998.

In ***Wildlife in North Carolina:***

- "Furry Enforcement Officers" by Chris Powell, November 2000.
- "A Flood of Memories" by Chris Powell, March 2000.
- "School of Hard Knocks" by Rodney Foushee, April 1999.
- "Heads Up for Poachers" by Chris Powell, September 1998.

GET OUTSIDE

Go Hunting or Fishing: North Carolina abounds with good hunting and fishing spots. If you don't know of any, visit the Web site of the N.C. Wildlife Resources Commission, www.ncwildlife.org. Rules, maps and even tips are available free. If you encounter a wildlife enforcement officer while enjoying the bounty of the outdoors, be sure to thank him or her. Wildlife officers work hard to make sure what we enjoy today will be available in future years and for future generations.

GET WILD

Free N.C. WILD Outdoor Skill Experiences coming up include:

Sept. 6 – *Orienteering for Hunters*, River Park North in Greenville, 5:30-9:30 p.m. Call (252) 329-4502.

Sept. 8 – *Orienteering*, Eastern 4-H Environmental Education Center, Columbia, 9 a.m.-3:30 p.m. Participants must be at least 16 years old. Call (252) 335-2345.

Sept. 12 – Endangered Species, Clark Park Nature Center, Fayetteville, 9 a.m.-3 p.m. Call (910) 433-1579.

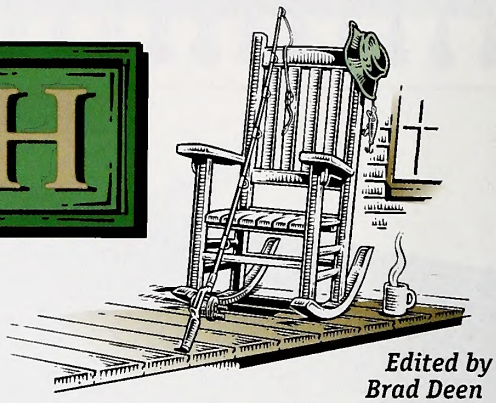
Advanced WILD workshops:

Sept. 20-21 – *Living with Wildlife: Do We Have a Wildlife Problem?*, Crossnore. Call (336) 674-6152.

Oct. 12-13 – *Piedmont Habitats*, Blue Jay County Park, Raleigh. Call Blue Jay Point, (919) 870-4330.

BACK PORCH

News and Wildlife Notes



Edited by Brad Deen

First Elk Born in the Smokies

A 40-pound elk was born recently in the Great Smoky Mountains National Park, the first to be born in the Smokies in 150 years. The male calf was also the first offspring of a herd that was transplanted to the park in February.

The elk was born toward the end of June, and researchers found the animal hidden in a blackberry thicket close to the meadows in Cataloochee Valley. A transmitter that was ejected from the mother's birth canal alerted researchers to the birth. All eight pregnant cows in the transplanted herd received these implants.

KEN WILSON

Using telemetry devices, researchers located the implant transmitter and the apparent site of the delivery, but it took another day and a half of searching to locate the calf. It was found about a third of a mile from the site of the delivery. Cow elk typically move their newborn calves some distance from the site of delivery as a survival mechanism.

Biologists placed an expandable radio collar on the calf to track its progress and determine survivability of future newborns. Whether or not elk can successfully reproduce will be a determining factor of the five-year elk experiment in the Smokies.

Brought to North Carolina from Land Between the Lakes in Kentucky, the herd of 25 elk was released near Cataloochee Valley as part of the study to determine if the species can become a permanent member of the wildlife community in the park.

The birth indicates that the animals are successfully reproducing and are likely comfortable in their surroundings.

"We are pleased with this announcement and the success of the elk experiment to date," said Michael Tollefson, superintendent of the Great Smoky Mountains National Park. "We ask that the public be good stewards and not approach the elk—particularly female elk with calves, which are known to charge people in defense of their offspring."

The herd released in the Smokies consists of Manitoban elk. The subspecies is considered a close relative of the now-extinct Eastern elk, which was extirpated from North Carolina during the late 1700s through overhunting and loss of habitat from logging.

Wildlife through the *Year*

September is usually the month hurricanes and tropical storms become a serious threat to our coast, and even a near miss can mean tree damage hundreds of miles inland. If you lose a quantity of limbs and small trees for whatever reason, consider creating small piles in the backyard instead of sending the debris to the landfill. Birds, rabbits and squirrels will be attracted to the locations like fish to an underwater reef. If you have wild rabbits around, consider placing two-foot sections of PVC pipe 5 to 10 inches in diameter under the piles of debris. The pipe sections simulate hollow logs, giving rabbits shelter from both the elements and predators.

—Chris Powell

WE'RE NOT IN KANSAS ANYMORE

Notice anything different—the rainbow of colors, perhaps? You are looking at the first all-new Back Porch, with eye-pleasing visuals to complement our well-read roundup section.

Back Porch will continue to function as a magazine within the magazine. Its shorter deadlines allow us to present timely information related to the N.C. Wildlife Resources Commission, the environment, wildlife and outdoor recreation. Previously, that separate deadline relegated Back Porch to a single color. New technologies and ways of working enable us to render this section with the same design flair as the rest of *Wildlife in North Carolina*.

With the revamped presentation, we have rethought Back Porch itself. Articles are shorter, punchier. Photos and graphics receive as much thought as the text. And as the new home of the long-standing Nature's Ways column, Back Porch gains a regular anchor feature, while Nature's Ways gains from the more colorful and readable format.

Let section editor Brad Deen know what you think of the changes at (919) 733-7123 Ext. 264, or deen.brad@coned.wildlife.state.nc.us.

Aquatic Survey Reveals Threatened Mussel

N.C. WILDLIFE RESOURCES COMMISSION

Until recently, North Carolina Wildlife Resources Commission biologists believed that Atlantic pigtoe mussels no longer existed in the Cape Fear River basin. That changed this summer when a survey of freshwater mussels in the Black River in Pender County turned up a single individual of the state-listed "threatened" species—the first to be documented in more than a decade.

Piedmont coordinator John Alderman, a nongame biologist with the Wildlife Commission, said the find was significant because the mussel now represents one of the last of what was a large population of the species in that area.

"The Cape Fear River basin makes up 18 percent of this state and is entirely North Carolina's, meaning we are the only ones who have an effect on it," Alderman said. "The mussel we found is the only one we know of to exist in the entire basin."

The Atlantic pigtoe is still believed to be missing from the Deep and Cape Fear rivers. However, the species does occur from the Ogeechee River basin in Georgia to the James River basin in Virginia. Historically, the species inhabited every Atlantic drainage in the Carolinas except the Cooper-Santee and Waccamaw river basins. But because of sedimentation and pollution, most mussel species have been in rapid decline.

Each year, Wildlife Commission nongame biologists spend considerable time and resources monitoring mussel populations, which are considered good indicators of a river's health. Because mussels filter water to extract food, they are most likely the first species to be affected by pollution or contamination.

The recent survey was conducted to establish a baseline density estimate of mussel populations that will allow biologists to determine either an upward or downward trend in the future. To sample the river, survey teams string lines across the river, creating a grid system of 4-meter square blocks. Within each block, a scuba diver pushes a hollow, metal square into the riverbed and scoops material from inside the box. The material is then placed into a metal container with a mesh bottom, which is brought to the surface.

In addition to the Atlantic pigtoe, biologists documented a half dozen other native mussel species in the Black River.

—*Chris Powell*

On Patrol

While working in the Big Ivey section of Wilkes County, Sgt. John Campbell Jr. and officers Rocky Hendrix and Kenneth Blankenship of the Wildlife Commission's enforcement division came upon a truck parked next to a creek. The wildlife enforcement officers followed tracks away from the truck and found the driver asleep — at a liquor still. The officers backed out of the area, leaving the still cooking and the man at his mid-morning nap. They contacted an agent with state Alcohol Law Enforcement and waited for him to arrive. Besides one startled suspected moonshiner, the arresting officers seized 20 gallons of illegal corn liquor.

Calendar of Events

Wednesday, Sept. 5

The Pisgah Center for Wildlife Education, Pisgah Forest, wants to stir creativity in children through River of Words, a national environmental poetry and art contest for ages 5-19, grades K-12. Participants in the 9 a.m.-1:30 p.m. workshop explore the watershed around the center, then craft an original poem or artwork. Sponsors are the International Rivers Network and the Library of Congress. Also offered Saturday, Sept. 22. Call (828) 877-4423.

Friday-Sunday Sept. 7-9

The Carolina Fall Boat Show and Sale at the N.C. State Fairgrounds in Raleigh will feature exhibits of power boats, marine accessories and fishing supplies. Call (336) 855-0208.

Saturday, Sept. 8

The Pisgah Center for Wildlife Education, Pisgah Forest, is offering a workshop on stream habitat investigation, 9:30 a.m.-2 p.m., for ages 12 and up. Determine water quality by insects, fish, amphibians and other creatures. Bring a lunch and either waders, boots or shoes that can get wet. Call (828) 877-4423.

Saturday, Sept. 8

The N.C. Wild Turkey Federation will hold a jakes event—teaching firearms safety and other points of turkey and grouse hunting—at the Biltmore Estate near Asheville. Start time is 8:30 a.m. The event is free and open to anyone ages 7-17. To register, call J.M. Taylor at (828) 684-7601.

Saturday, Sept. 15

Monarch butterflies will be the topic of a presentation and nature walk at the Cradle of Forestry in America national historic site, Pisgah Forest, at 2 p.m. Call (828) 877-3130, or log onto www.cradleofforestry.com.

Saturday, Sept. 29

An introduction to fly-fishing for women ages 16 and up will be offered at the Pisgah Center for Wildlife Education, Pisgah Forest. The all-day course, 9:30 a.m.-4 p.m., will cover casting, knots, fly-tying, aquatic habitat and equipment. The $15 fee includes lunch. Bring waders or waterproof shoes. Call (828) 877-4423.

Did You Know?

- By the end of August deer antler growth is complete. By the end of September fawns have lost the white spots on their coat.
- Of the state's herd of 1 million deer, more than 250,000 die annually. Hunting accounts for 50 to 70 percent of mortality; the rest fall to automobiles, parasites, diseases, depredation, fences, dogs, machinery and environmental factors such as drought or blight.
- A deer's age cannot be determined from the number of points on its antlers, although age is a factor in antler characteristics, as are diet and genetics.
- White-tailed deer in the Southeast generally stay within home ranges of 200 to 1,000 acres; bucks range farther than does, especially during the rutting season.
- Although bucks establish scrape territories before breeding season to ward off rivals, they are actually more social than does, forming loose-knit herds after breeding season.
- The duration of the rut varies by region in North Carolina, lasting from September through February at the coast and from late October through March in the mountains.

Trout Hatchery Gets Major Renovation

BRAD DEEN

Feeding time at Armstrong Hatchery

The N.C. Wildlife Resources Commission recently upgraded Armstrong State Fish Hatchery near Marion, increasing the facility's trout-raising capacity by a fourth—from 200,000 fish a year to 250,000.

"Since the '60s, nothing was done to this hatchery," said supervisor Kyle Briggs. "The design, if it was state-of-the-art at the time, wasn't the day after."

The $1.7 million renovations were a combination of low- and high-tech. A sheet-metal building replaces the stove-heated shack that housed hatchlings. Fencing keeps bears out of the raceways—long pools where fingerlings grow to catchable-sized browns, brookies and rainbows.

Computerized monitoring maintains conditions just right in the cold water. Alarms wired to fiber-optics cable instantly page hatchery technicians if something goes wrong. And new oxygenators supersaturate the water, supporting more fish in slightly less space.

"It gives us optimal efficiency," Briggs said.

The renovation, funded by federal grants and the commission's Endowment Fund, shut down Armstrong for eight months from April 2000 through January. Pisgah State Fish Hatchery near Brevard picked up the hatching and raising slack, although Armstrong's employees still had to stock the trout waters within its 10-county area.

Anglers should not have noticed a difference. "Every fish that was supposed to be stocked, was," said Mallory Martin, fisheries supervisor for the mountain region.

MELISSA McCAW

Best to Leave Bears Alone

The Durham police shooting of a black bear in June is a reminder that bear-human encounters can be dangerous—to bears and to humans.

Bears are naturally shy creatures, said George Strader, a wildlife biologist with the N.C. Wildlife Resources Commission. But they will attack if they feel threatened.

"If you see a bear, don't approach it, of course. Don't provoke it in any way," said Strader, who lives in Durham County. "It's best to give them a wide berth. Let them leave on their own. Don't make it feel like it's being cornered."

Bears typically avoid humans, he said. The yearling male that caused two days of bear sightings across residential northwest Durham was probably looking for a territory of its own.

"They'll stay in the area a short time, then they're gone, especially if people don't provide them a reason to be there," he said.

Black bears—the only bear species native to North Carolina—are uncommon in the Piedmont. Although their range has expanded since the 1970s, black bears are still more likely to be found in western mountainous and eastern coastal counties.

The bear killed in Durham probably wandered inland from the east, wildlife officials speculated, or it could have roamed south from a bear restoration area in Virginia. Bears will also stray from their home ranges when their favored foods are in short supply.

Although some males weigh more than 500 pounds, most black bears prefer to flee rather than to fight. Only when cornered or with cubs will they display anger and aggression by lowering their heads and flattening their ears. When that occurs, it's best not to run, but to back away slowly while making a lot of noise.

Such encounters can be avoided, however, by avoiding bears. If you see one, go inside and take children and pets with you.

Don't give bears a reason to linger. Dispose of garbage properly—storing it in the garage or inside a bear-proof container. If you must feed your pets outside, remove all containers immediately afterward.

And above all, don't feed bears. "Bears are perfectly capable of fending for themselves," Strader said. "When you feed them, they start associating people and food. You want them to maintain their natural fear of humans."

To learn more about preventing problems with black bears, request a copy of the Wildlife Commission's 12-page booklet Living in Black Bear Country *by writing the Division of Wildlife Management, 1722 Mail Service Center, Raleigh, NC 27699-1722. Or call (919) 733-7291.*

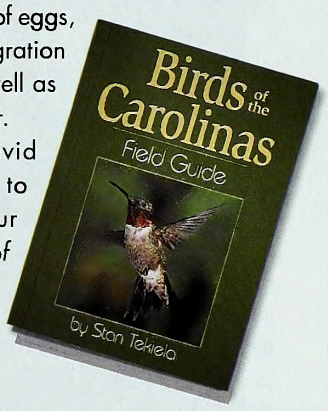
Book Review:

Birds of the Carolinas

One of the most popular outdoor pastimes, bird watching pulls 64 million Americans to the field every year. There are more than 415 bird species recorded in North and South Carolina, and identification can become difficult without a quality reference. *Birds of the Carolinas Field Guide* is designed to make bird identification fast and easy.

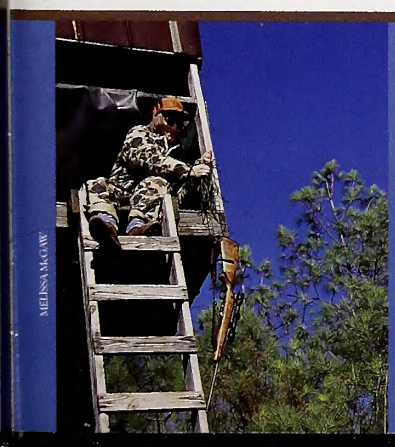
Author Stan Tekiela has chosen 140 of the most common and visible bird species to profile. The field guide is subdivided into 10 color sections that correspond to the predominant color on each bird. The color system is an excellent method of referencing a bird that might be gone in a flash. For example, a male cardinal would be in the red section, a bluebird in the blue section, and so on.

Within the sections, two pages are dedicated to each bird with a color photograph on one page and quick blurbs on the facing page. In an instant, a birder can find the size of the bird, a description of its female counterpart and nest, number of eggs, incubation, fledging, migration and preferred food, as well as brief notes from the author.



Whether you're an avid birder or simply want to know who's visiting your back-yard feeder, *Birds of the Carolinas Field Guide* is an excellent reference guide anyone can easily use.

Birds of the Carolinas Field Guide
by Stan Tekiela, Adventure Publications, P.O. Box 269, Cambridge, MN 55008, 343 pages, paperback 2001, $14.95 plus $2 shipping and handling.



MELISSA McCAW

Attention Women Deer Hunters

Registration is now open for the N.C. Wildlife Resources Commission's Becoming an Outdoors Woman deer hunt. The Beyond BOW program will take place Nov. 19 and 20 at the Griffin Hill Hunting Preserve, located near Wadesboro in Anson County. The fee will be $200 per person, which will cover food, lodging and one afternoon and one morning hunt. Participants will also be instructed on hunter safety, tracking blood trails, outdoor cooking and more.

The program will be limited to eight participants, and registration must be completed no later than Oct. 31. For more information, call B.B. Gillen at (919) 733-7123 Ext. 260.

Catch Us at these Numbers

1-800-662-7137 to report violations of hunting and fishing laws

1-800-628-3773 (NC VESSEL) for boat registration and titling

1-800-675-0263 for hunting dates and shooting hours for migratory game birds

1-888-248-6834 (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone

1-800-446-8663 (I GOT ONE) to report big game harvests

Connect to the Commission's online Web site at **www.ncwildlife.org**

Calls are answered in order, but some numbers may require a wait during busy seasons.

Wildlife Endowment Fund Report

Fund Balance $44,089,417.07

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to Wildlife in North Carolina *magazine, as well as from tax-deductible contributions. Although the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.*

September Teal Season Approved

A last-minute appeal to the Atlantic Flyway Council resulted in a September teal season being approved for North Carolina.

The 2001 teal season will be Sept. 6-15, east of U.S. 17, with a bag limit of four and a possession limit of eight teal.

North Carolina had been slated for exclusion from the special teal season because a certain condition was not met during a three-year experimental period. The U.S. Fish and Wildlife Service initiated the experimental teal season in 1998 to determine if teal could be hunted without other waterfowl being mistakenly shot out of season. In order to continue with the season, no more than 25 percent of the ducks shot at could be other than teal.

KEN TAYLOR

According to actual observations of hunters, the 25 percent margin was exceeded during two of the three years in North Carolina. The Atlantic Flyway Council, a coalition of eastern states, had recommended to the U.S. Fish and Wildlife Service that North Carolina and South Carolina be excluded from the teal season. However, N.C. Wildlife Resources Commission representatives asked the Flyway Council to reconsider its guidelines for eligibility.

"Although the evaluations indicated that North Carolina hunters were not in compliance with the guidelines, we suggested that the council should consider the hunter observations pooled from all six states rather than from each individual state, and they agreed," said David Cobb, chief of the Division of Wildlife Management.

Dennis Luszcz, the Wildlife Commission's migratory bird coordinator, said that the teal season could still be taken away in the future. He advises participating hunters to police their own ranks and make positive identifications before shooting.

Nature's Ways

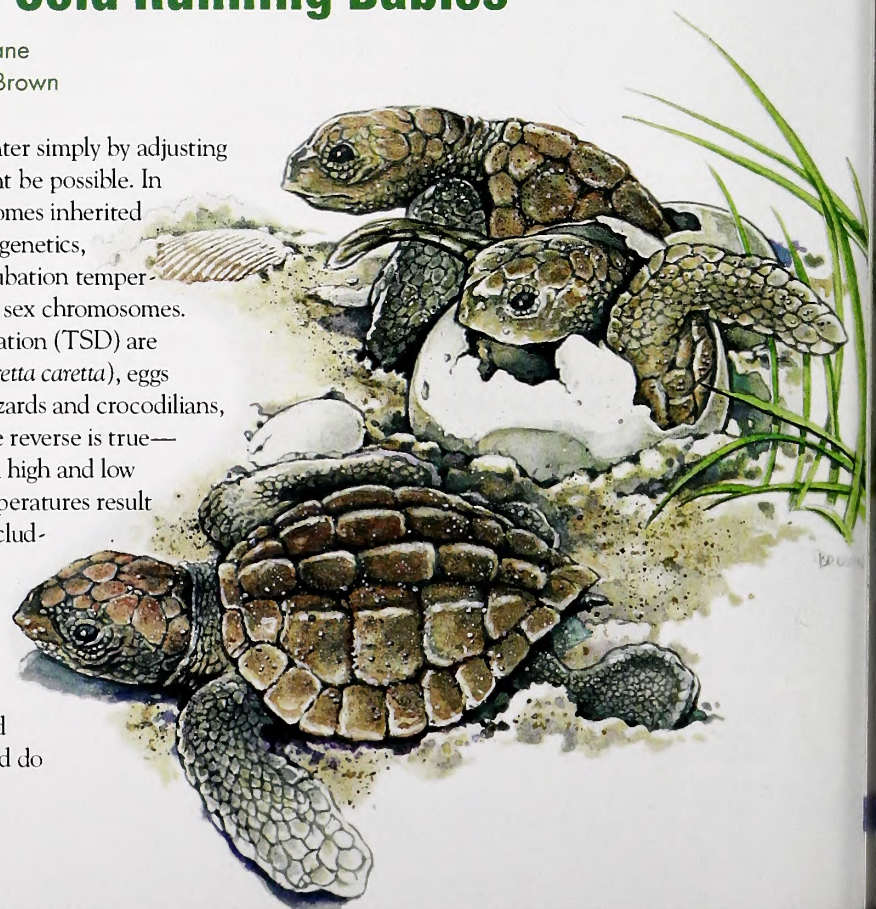
Hot and Cold Running Babies

written by Jeff Beane
illustrated by Jim Brown

What if you could decide whether to have a son or a daughter simply by adjusting your thermostat? If you were a turtle or an alligator, that might be possible. In most organisms, sex is determined at fertilization by chromosomes inherited from the parents. But in some, the environment, rather than genetics, determines the sex of offspring; and in many reptiles, egg incubation temperature is the deciding factor. Most such reptiles lack detectable sex chromosomes.

Three basic types of temperature-dependent sex determination (TSD) are known. In many turtle species, including the loggerhead (*Caretta caretta*), eggs incubated at higher temperatures produce females. In some lizards and crocodilians, including the American alligator (*Alligator mississippiensis*), the reverse is true—higher temperatures produce males. A final pattern, in which high and low temperature extremes produce females and intermediate temperatures result in males, occurs in several crocodilians, lizards and turtles, including the common snapping turtle (*Chelydra serpentina*).

The adaptive advantages of TSD have been the subject of much research and speculation. Such a strategy may provide greater versatility in the face of changing environmental conditions. TSD is an important consideration in "head-start" conservation programs where eggs are incubated artificially: Accidentally skewing a population's sex ratio could do more harm than good!



N.C. WILD STORE

NEW!

SPORTING HERITAGE T-SHIRT

Our sporting heritage products have a purpose—to honor North Carolina's sporting traditions. What could be more treasured than the thrill of hooking a largemouth on the calm waters of an old millpond? This all-cotton tee spotlights bassfishing traditions with a Duane Raver painting of a largemouth at Atkinson's Mill, where water-powered wheels have been grinding corn in Johnston County since 1757. The sporting heritage logo on the front complements the distinctive scene on the back. This T-shirt will give your friends and family members something worth remembering. Adult sizes, medium to XX-large.

$14.50

ITEM CODES:

A12MED (medium)
A12LRG (large)
A12XLG (extra large)
A12XXL (extra extra large)

Left front design

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

You can order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Salamanders of North Carolina

Explore the hidden world of some of North Carolina's most unique creatures. This poster both educates and captivates with color photographs of the 13 salamander species in North Carolina that have lungs or gills. Habitat and life cycle notes for each species accompany the illustrations (24" x 36").

$6 ITEM CODE P19

▲ Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE P17

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE P15

Rare Butterflies of North Carolina

$8 ITEM CODE P16

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set (P17). Guide also sold separately.

$2 ITEM CODE M5

▶ Amphibians: Frogs of North Carolina Poster Set

Set of two posters in full color: The Hylid Frogs and True Frogs & Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom (22" x 34").

$10 ITEM CODE P20

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE P11

Amphibians: True Frogs & Toads

$6 ITEM CODE P14

◀

Sporting Dogs of North Carolina

Pointing & Retrieving Breeds This first poster of a two-part set on North Carolina's sporting dogs depicts a dozen breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. (22" x 34")

$10 ITEM CODE P18

▲ Sporting Heritage Posters

These sporting heritage posters preserve two treasured traditions. Each poster is 22" x 34".

Traditional Trout Flies of the Southern Appalachians

Color illustrations of 16 trout flies accompany brief histories and detailed descriptions. $10 ITEM CODE P13

Waterfowl Decoys of North Carolina

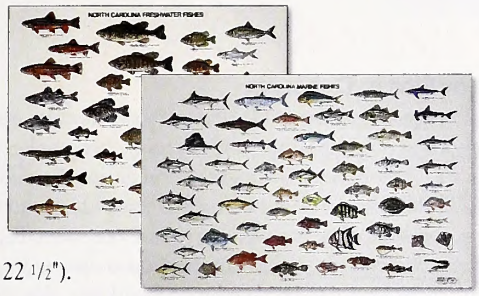
Descriptions of classic decoys made during the heyday of waterfowl hunting complement 19 color photographs. $10 ITEM CODE P12

Reptiles of North Carolina ▶

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

$18 ITEM CODE P10

Fishes of North Carolina



Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").
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Pisgah Center for Wildlife Education T-shirt

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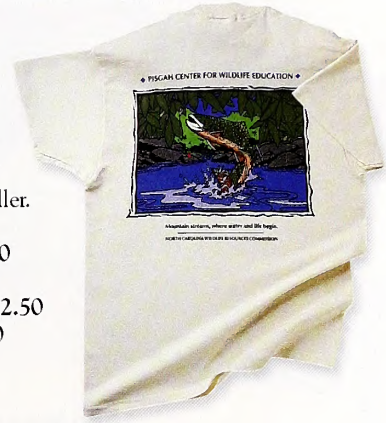
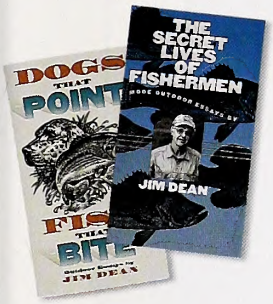
A8XXL (extra extra large)



Wee Tees

Just like the adult shirt, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50



Dogs that Point, Fish that Bite

Sample 50 of Jim Dean's best essays for *Wildlife in North Carolina* magazine.
Hardbound $19.95 ITEM CODE **M8**
Paperback $10.95 ITEM CODE **M12**

The Secret Lives of Fishermen

More of Jim Dean's well-honed observations on hunting, fishing and the country life.
Hardbound $24.95 ITEM CODE **M13**

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Wildlife in North Carolina Caps

Exclusive designs and magazine logo are featured on four different cap styles.
$16.50 each

A11

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- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

A3

A6

A7

A1

N.C. WILD Caps.

N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.
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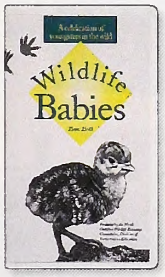
A10

All Things Are Connected

Video and Activity Guide.
Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.
$22 ITEM CODE **W3**



Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.
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Items not pictured:

Bird Houses and Feeders: How to Build and Enjoy Them

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.
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Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.
$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each
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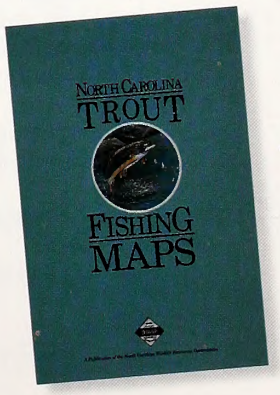
Girl Scout Correlation ITEM CODE **E10**



North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format maps in this booklet provide color-coded information on regulations for each stream. Each map also depicts game land boundaries, federal lands and state parks, as well as major roads and towns.
$12 ITEM CODE **TMAP**

◀ Rivers of North Carolina

In this 128-page special issue of *Wildlife in North Carolina*, some of the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Their stories and illustrations cover a multitude of subjects—from canoe trips to water-quality to the real-life experiences of people working to save our rivers. Pages of eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

2000 Migratory Waterfowl Print and Stamp Set ▶

This limited edition print signed by artist Ron Louque depicts the grace and color of canvasbacks in flight at North Carolina's historic Whalehead Club. Your purchase will support the Wildlife Commission's efforts to manage wetlands and restore waterfowl populations. Overall size is 12" x 14"; image size 6 1/2" x 9". ***This item is not subject to 15% discount.***

$145 ITEM CODE **DSP00**

North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

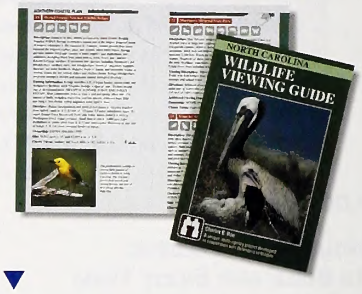
Explore the diversity of the state's natural communities in an 82-page soft-cover book written by naturalists and journalists. This guide describes 13 habitats across the state with captivating illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a North Carolina WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

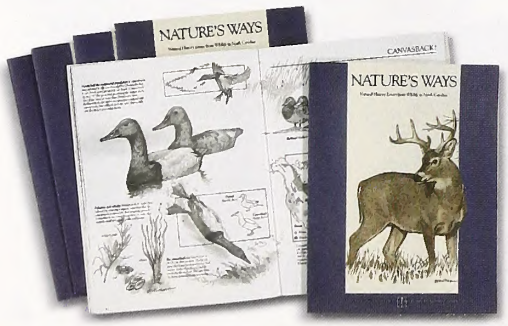
$16 ITEM CODE **E6**

North Carolina Wildlife Viewing Guide ▼

From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**





Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

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N.C. WILDLife Profiles Binder & N.C. WILDLife Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**

THE 2002 NORTH CAROLINA WILDLIFE CALENDAR IS HERE.

A hunting dog, an old pickup and a favorite shotgun make for a perfect day afield in this timeless painting by Larry Chandler. "Anticipation" is just one example of the fine art featured in the *2002 North Carolina Wildlife Calendar*. To order yours, use the convenient order form at the front of this magazine.

"Anticipation"
Larry Chandler

courtesy of Mr. Richard Kowallik

NOVEMBER 2002

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
October S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Fishing Days Best Good Fair Poor Moon Phases ● New ◐ Last Quarter ○ Full ◑ First Quarter	Report Wildlife Violations Call Toll-free 1-800-662-7137	To subscribe to WILDLIFE IN NORTH CAROLINA MAGAZINE call 1-888-248-6834	1 • Speckled trout fishing peaks	2
3	4 Invest in the future with a lifetime subscription to *Wildlife in North Carolina.* ●	5 Election Day	6	7	8	9 • Wood duck migration peaks
10 • Peak deer rut in Coastal Plain	11 • Pintail and widgeon migrations peak Veterans Day ◑	12	13 • Green-winged teal migration peaks	14 Order gifts from the N.C. WILD Store to ensure delivery by Christmas.	15	16 • Groundhogs, chipmunks, skunks begin hibernating
17	18	19 ○	20 Lifetime licenses—the ideal gift for that special sportsman	21	22	23
24	25	26 • Piedmont deer rut peaks	27	28	29	30

Bird's-eye View

A bobwhite quail stands atop a fence post, overlooking a field. A major initiative is underway to promote quail populations in North Carolina. The story begins on page 2.

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CONOVER, NORTH CAROLINA

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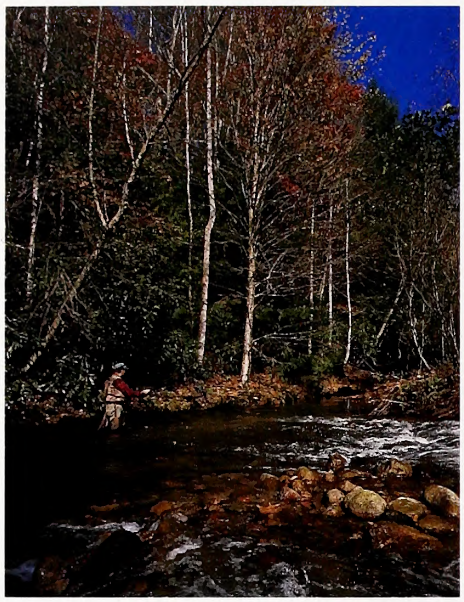
WILDLIFE IN NORTH CAROLINA

OCTOBER 2001 $1.50

The Angler Hedonist

by Jim Dean



JIM DEAN

"I like to reserve the most glorious time of the year for the sole purpose of doing whatever I want to do precisely when I think to do it."

Every year when I get my new calendar, I go through and mark a few key days—important birthdays, opening day of the trout season, that sort of thing. Fall always gets special treatment. I block out the last two weeks of October, and sometimes the first week of November. Anyone planning weddings, births, reunions, nervous breakdowns or other important events—including most funerals—is well advised not to anticipate my attendance.

It is not that I have scheduled any particular activity during this period. That's the point. I like to reserve the most glorious time of the year for the sole purpose of doing whatever I want to do precisely when I think to do it. Unquestionably, this is a selfish indulgence. Semi-retirement rewards us with increased flexibility (except in the knees) and the opportunity to yield to repressed hedonism.

Typically, I spend a day or two packing the vehicle. Because my layovers invariably seem to adjourn where there are opportunities to fish, I always have tackle that will handle anything I might encounter from the mountains to the sea. Once packed, I have the delicious sense of being poised like a bullet atop a hair trigger. I watch the weather, seeking the moment. On several occasions I have impulsively departed in mid-evening, driving most of the night with my destination determined more or less en route.

Last October, I hung around for several days lamenting the stifling weather and noting also that Jack Frost was late getting his colorful palette organized. Then, a sharp cold front blew through, and I was away in a flash, heading west. I'm no stranger to fleabag motels on these trips, but I'm also fortunate to have access to some wonderful camps here and there that serve as the hubs of regional forays. On this trip, I spent the first four or five days at a primitive mountain cabin I've rented in Pisgah National Forest for the past 35 years—outhouse, Coleman stove, tiny 1940s Frigidaire, single bulb dangling on a cord, lumpy bed, spring water gravity-fed to an old sink and fine trout streams coursing nearby.

Each morning, the rising sun cleared the distant ridge at precisely 9 a.m., just as I took my first cup of steaming coffee out on the porch to greet it. Under amazingly brilliant skies brushed with falling leaves of scarlet, gold and russet, I fished several staircased mountain streams for small wild browns and rainbows. The water was low, and the pools were deep emerald. Because it was midweek, I seldom encountered another fisherman, especially after walking two or three miles into remote headwaters. Evenings, I uncorked a good red, cooked a meal and read myself to sleep listening to Frank Sinatra over the hiss of the woodstove.

Then, impulsively, I packed up and headed for Tennessee to fish the Watauga and South Holston tailwaters. There are bigger trout there, and it is more like fishing rivers out West. Since the trout are attentive to hatches of aquatic insects, it is also more humbling.

At some point, however, I began to feel the call of the coast. The weather had turned warm again, so I drove straight through, thinking how nice it would be to take walks on the beach, poke around antique shops, take naps and fish the surf. Any shrimp the fish didn't eat would sauté nicely for supper. Besides, it might not be too late to find homegrown tomatoes at a roadside stand.

I won't claim that spots, pompano and the occasional flounder caught on shrimp and light spinning tackle constitute a greater challenge than those picky tailwater trout, but I find such fishing equally satisfying. When you know your days are numbered (at least for another season), there may be no finer way to count them off than staring at breaking waves under bright sun and billowing clouds while foam curls around your ankles. Who cares that the pinfish have long since stolen your bait?

Just this past spring, I learned another way to enhance these seasonal meanders. On the tail end of a trip to fish the Henry's Fork of the Snake River in Idaho, I stood overlooking the river at dusk with David Smith. David had two days left before driving back to his home in Oregon.

"This has been another wonderful trip," he mused. "But I've learned a little trick in recent years. I leave when my cup is full."

"You're going home today?" I asked, incredulously. "Before you have to?"

"Yep, right now," he answered. "No sense hanging around and spilling any of it."

And he left.

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Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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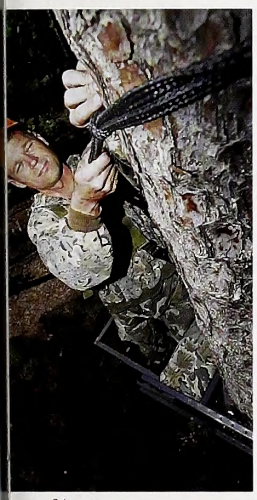

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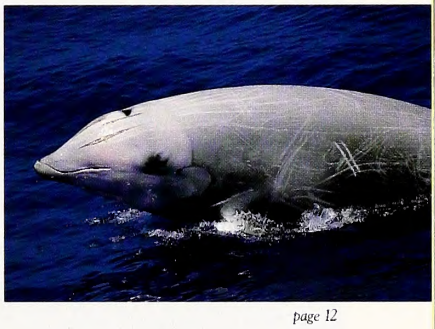

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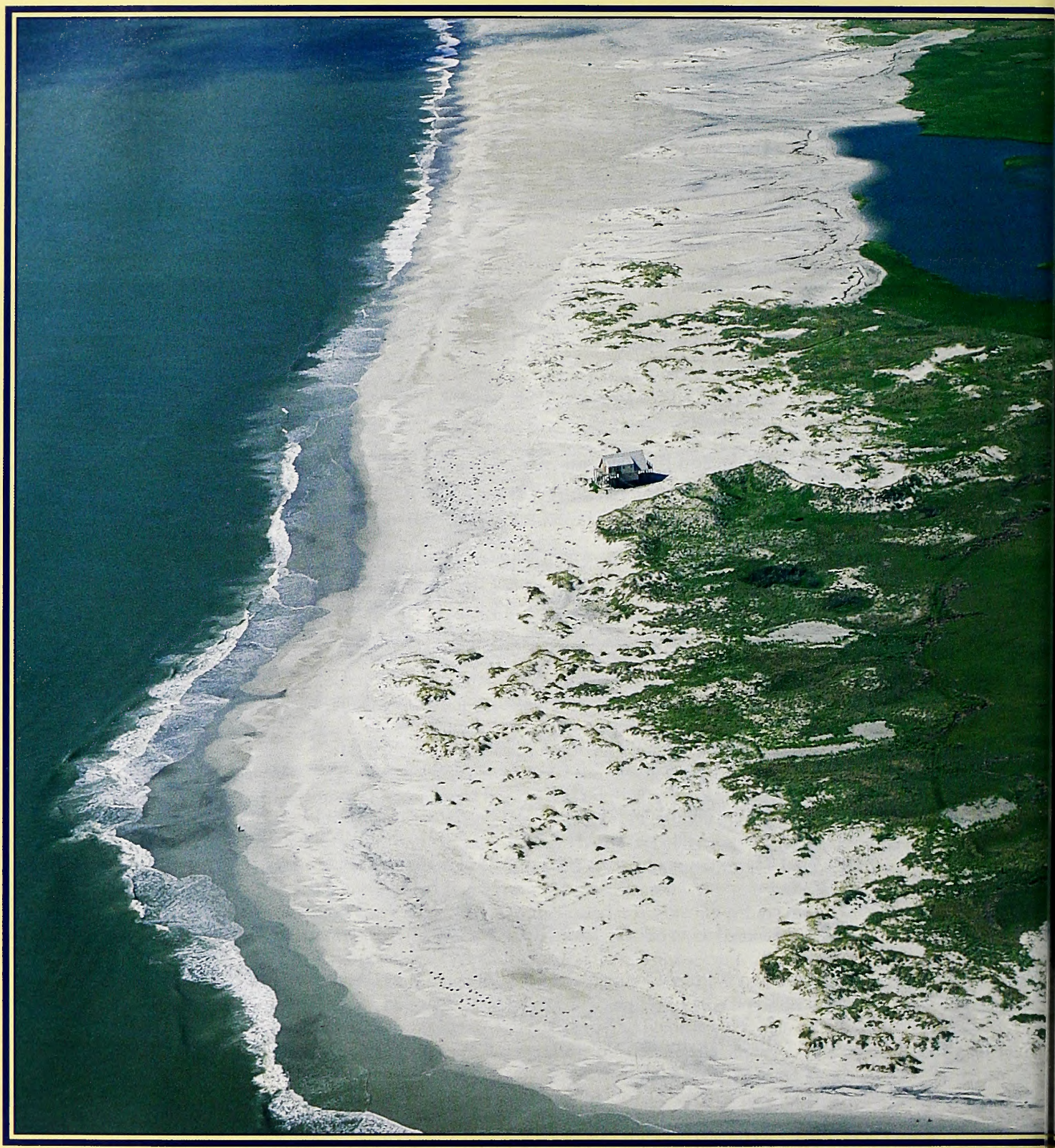
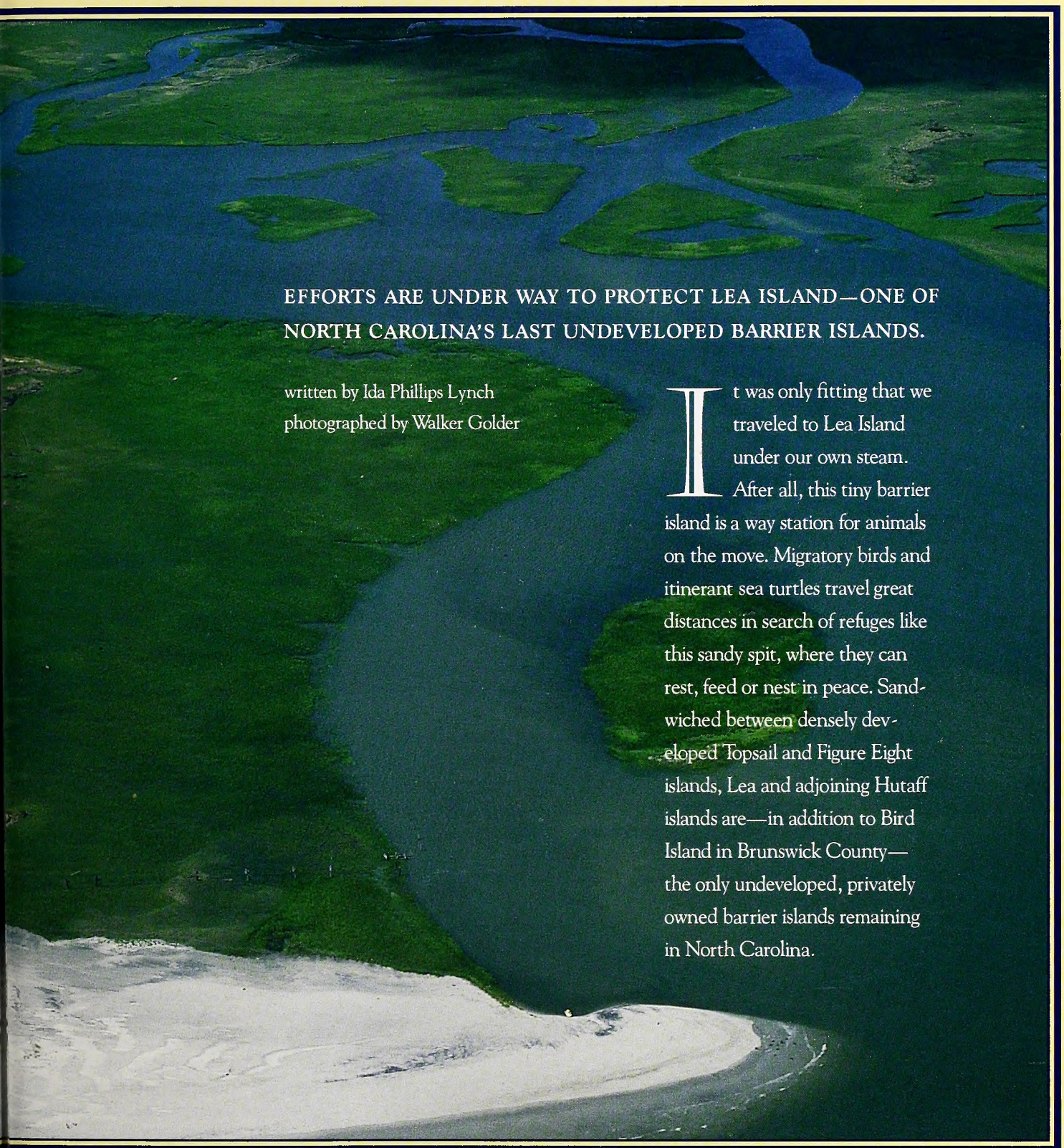


TO SAVE AN



EFFORTS ARE UNDER WAY TO PROTECT LEA ISLAND—ONE OF NORTH CAROLINA'S LAST UNDEVELOPED BARRIER ISLANDS.

written by Ida Phillips Lynch
photographed by Walker Golder

It was only fitting that we traveled to Lea Island under our own steam. After all, this tiny barrier island is a way station for animals on the move. Migratory birds and itinerant sea turtles travel great distances in search of refuges like this sandy spit, where they can rest, feed or nest in peace. Sandwiched between densely developed Topsail and Figure Eight islands, Lea and adjoining Hutaff islands are—in addition to Bird Island in Brunswick County—the only undeveloped, privately owned barrier islands remaining in North Carolina.

ISLAND

***Located between** heavily developed Topsail and Figure Eight islands, Lea and adjoining Hutaff islands lie amid expansive tidal creeks and marshes. This estuarine habitat nurtures fish, shellfish and many species of birds.*

Accessible only by boat, this Pender County island has been relatively unknown to all but a few local anglers and boaters. Now that a coalition of North Carolina conservation groups is working to protect Lea as a state-owned natural area, the low-profile island has been receiving a lot of publicity. Driven by curiosity and a fondness for untrammeled places, my husband, Merrill, and I pulled out our topo maps this summer and plotted a kayak trip to this sliver of sand that had somehow escaped the long arm of civilization.

We left early on the first day of July, hoping to avoid the summer heat and the inevitable hordes of energetic, motorized boaters. After fueling up at the Golden Arches like good Americans—assuring ourselves that the day's exertions would atone for this gastronomic sin—we launched our kayaks into the glassy waters of the Intracoastal Waterway. Boat traffic was light, and we slowly slipped into the paddling rhythm, admiring the deep-green marsh grass glowing in the early morning sunlight.

As we headed north toward New Topsail Inlet, a wary osprey guarding its platform nest greeted us with a high-pitched warning call. When we approached the back of the extensive marsh system behind Lea Island, a distinctive song rang out from a dredge-spoil island, and Merrill pointed out a kaleidoscopic painted bunting perched in the top of a dead tree.

We turned into a serpentine tidal creek and drifted through the marsh on the outgoing tide, watching boat-tailed grackles stride around on exposed mud flats. A black skimmer glided over the water, its lower bill slicing the surface, and a royal tern flew overhead, gingerly carrying a fish in its brilliant-orange beak. The wind picked up as we neared the north end of Lea Island, and we paddled harder to cut into a sheltered cove. After pulling the boats onto the shore, we stretched our cramped legs and walked down the beach into the island's interior.

ISLAND TIME

Although we were not alone on the island, it was fairly deserted by North Carolina standards. About 10 other people had ventured to Lea that morning to fish, shell and swim in

"THE ISLAND CONTAINS EVERYTHING A BARRIER ISLAND SHOULD HAVE—NESTING SEABIRDS, SHOREBIRDS, SEA TURTLES, NATURAL VEGETATION, A WELL-DEVELOPED MARSH SYSTEM AND AN OUTSTANDING ESTUARINE SYSTEM."

—Walker Golder

relative solitude. Waves leisurely rolled onto the shore, and columns of cumulus clouds drifted slowly over the Atlantic. Except for a dilapidated pier and a house standing on tall stilts, the 60-acre islet is free of man-made structures. The tranquil scene stands in sharp contrast to neighboring Topsail Island, where rows of houses seem to run endlessly into the distance. On the congested North Carolina coast, Lea Island is an anomaly.

"Lea Island is the best example of a barrier island system in this part of the state," said Walker Golder, deputy director of Audubon North Carolina, the conservation organization that will eventually manage the island for the state. "Lea doesn't have any off-road vehicle traffic, its beaches have never received any dredged sand, and no sea oats or beach grass have been replanted here. And the island contains everything a barrier island should have—nesting seabirds, shorebirds, sea turtles, natural vegetation, a well-developed marsh system and an outstanding estuarine system."

Most of the low-lying island is less than 10 feet above sea level, although sea oats anchor a row of frontal dunes that reach 20 feet in height in a few places. Plants like the succulent sea rocket and the federally threatened seabeach amaranth form sandy mounds in front of the dunes. A scrubby maritime shrub community containing wax myrtle and yaupon grows in sheltered depressions behind the dunes. Tidal creeks finger through 1,200 acres of salt marsh behind the island, providing a nursery for fish and shellfish and an invaluable feeding ground for wading birds, seabirds and other waterfowl. The highest point in the marsh is a small island that contains a rare maritime evergreen forest distinguished by 100-year-old live oaks.

As with all barrier island systems, Lea Island is in a constant state of flux. Every storm redesigns the island's topography, as winds and waves buffet the high ground and storm overwash frequently inundates the entire island. New Topsail Inlet is slowly migrating southward into the island. Storm overwash sealed up Old Topsail Inlet, fusing 1.5-mile-long Lea Island with 2.5-mile-long Hutaff Island, formerly known as No Name Island.

But unlike most of North Carolina's barrier islands, wind and water are the only earthmovers on Lea Island. "The island has been allowed to go through the natural changes that barrier islands go through, being battered by storms, erosion, accretion, overwash—all these natural processes that have been going on forever," said Golder. Although this constantly changing environment makes human inhabitation a risky venture, many plants and animals thrive in this tumultuous place.

FOR THE BIRDS

We discovered that birds, not people, were the most abundant beach-lovers on Lea Island. Willets darted in and out of the surf, bobbing their heads and calling in singsong voices. Tiny least terns chattered like airborne squeak toys. North America's smallest tern, this feisty bird is known for dive-bombing people and animals that venture too close to its nests. The Audubon Society has roped off portions of the island so that terns and other colonial shorebirds can nest here undisturbed.

"Lea-Hutaff Island is probably the most important beach nesting area for birds in North Carolina south of Cape Lookout," said David Allen, coastal nongame project leader for the N.C. Wildlife Resources Commission. Allen estimated that between 15 and 20 percent of North Carolina's 1,500 breeding pairs of least terns nest on Lea-Hutaff Island, as do some of the state's largest colonies of black skimmers, common and gull-billed terns, and a few pairs of federally threatened piping plovers.

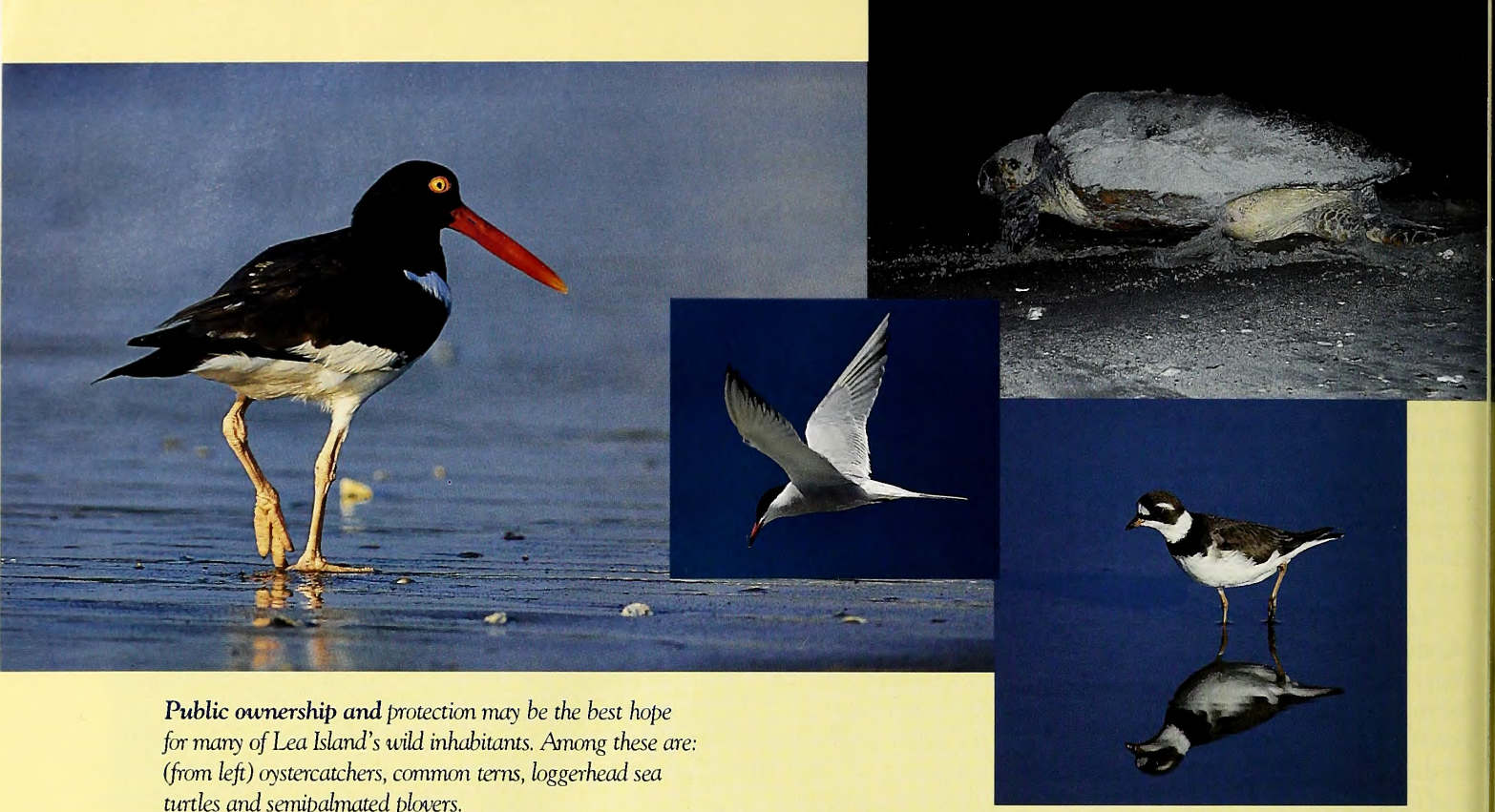
Colonial shorebirds such as least terns, gull-billed terns and black skimmers prefer to build their shallow, cup-shaped nests on bare sand-and-shell beaches containing little or no vegetation. Storms and unusually high tides create these early-successional beach habitats by flooding an island, scouring the beach and flattening the dunes.

Yet the rising tide of beachgoers—both vacationers and permanent residents—is causing problems for vulnerable ground-nesting shorebirds. Populations of colonial shorebirds, including the species that nest on Lea Island, are declining. Not only can development destroy shorebird nesting sites, but people also inadvertently disturb nesting areas when they try to "clean up" the beach after a storm.

"Overwash sand provides the early-successional habitat that many shorebirds need for nesting and foraging," said Allen. "But when Mother Nature tries to create the habitat the birds need, we're pretty determined to put it back the way we want it by building the dunes back up

MERRILL LYNCH

***Signs warn visitors** to Lea Island not to disturb the nesting sites of vulnerable shorebirds, such as this tern and chick.*



***Public ownership and** protection may be the best hope for many of Lea Island's wild inhabitants. Among these are: (from left) oystercatchers, common terns, loggerhead sea turtles and semipalmated plovers.*

and rebuilding our structures and roads."

Even a family outing at the beach can wreak havoc on a nesting bird colony. When people or their pets walk too close to a nesting colony, adult birds often abandon their nests to ward off the intruders, exposing their eggs or young to predators and the searing sun. "There are more people than ever on the beach," said Golder. "All those people with their pets just enjoying a day at the beach can wipe out an entire colony of terns."

The dramatic increase in coastal development has also caused an explosion in populations of "urbanite" animals that prey on shorebird eggs and chicks, including feral cats, raccoons and crows.

Migratory shorebirds such as the semipalmated plover, dunlin and whimbrel also rely on Lea Island as a stopover site. They can rest there and rebuild their fat reserves while migrating between their breeding grounds in the Arctic and their wintering grounds in southern North America and the Tropics.

Protected islands like Lea may be the ultimate hope for survival for many shore- and wading birds. "These birds have been pushed out of their historic habitats," said Golder. "So it's important to protect all the remaining colony sites and, ideally, provide permanent protection through acquisition. They're not making any more places like Lea and Hutaff. These islands are absolutely essential to nesting sea- and shorebirds in this part of the state."

Lea Island's people-free environment attracts another long-distance traveler, the federally threatened loggerhead sea turtle. From May to August, female loggerheads crawl up beaches on North Carolina's barrier islands in search of suitable nesting sites near the dune line. On developed islands, a turtle may become disoriented by artificial dunes and lights and abandon its nesting effort. Even if the female successfully nests, the hatchlings must contend with human disturbance and numerous predators, including raccoons and gulls. The odds are daunting: Out of every 1,000 hatchlings, only a few survive to adulthood. Although biologists have just begun surveying nesting turtles on Lea Island, Golder estimated that at least 50 turtles have nested there in recent seasons.

THE PAST

When you visit this untouched island, you inevitably wonder how it managed to escape the rampant development occurring in Pender County and all over the North Carolina coast. In the 1970s, developers platted and subdivided the island into approximately 50 lots ranging from 1 to 2 acres. According to *The North Carolina Shore and Its Barrier Islands*, written by Duke University geology professor Orrin H. Pilkey and others, "Lea Island was promoted by developers in the 1970s as 'exclusive' and 'secluded,' both of which were true, as the island is accessible only by boat."

After the developers sold the lots, a few property owners built houses; but for the most part, the island remained undeveloped. Eventually, a fire and the Atlantic consumed two of the structures, so that only one house remains on the island today. As well, eight of the original 50 lots are now underwater, victims of migrating New Topsail Inlet and the eroding beachfront. As Pilkey wryly noted, "Some of the land that was 'exclusive' in the 1970s is now under the sea."

In studying Lea Island over the past 20 years, William Cleary, professor of geology at the Center for Marine Sciences at the University of North Carolina at Wilmington, has watched New Topsail Inlet gnaw away at the north end of the island. He believes that many lot owners shelved their building plans because they found that this "dynamic little piece of real estate"—a reference to its constant movement, not its development potential—was just too unstable for their peace of mind. "When people built a couple of houses on Lea and those began to erode or be encroached upon, people began to take notice," Cleary said.

Golder believes that the recent spate of

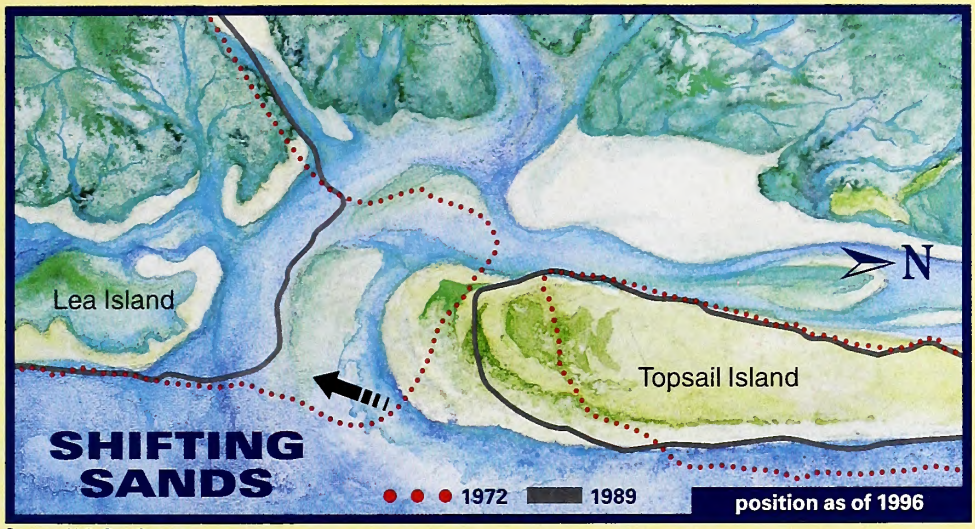
hurricanes on the North Carolina coast also affected landowners' plans for Lea Island. "The real decision-maker came when five hurricanes hit us directly in a period of four years," he said. "That seems to have changed the minds of some property owners."

CONSERVATION PLANS

Nature's powers of persuasion helped create a window of opportunity for North Carolina conservation groups to acquire Lea Island for public ownership. In 2000, the N.C. Division of Parks and Recreation and two nonprofit organizations, Audubon North Carolina and the N.C. Coastal Land Trust, began working with private landowners on this multiyear conservation project. The Coastal Land Trust is working with lot owners to broker the acquisition on behalf of the state. The Division of Parks and Recreation will hold title to the island as a state natural area, and Audubon North Carolina will manage the island through a 99-year lease. A $780,000 grant from the U.S. Fish and Wildlife Service's National Coastal Wetlands Conservation Grant Program and a $300,000 grant from the N.C. Natural Heritage Trust Fund are funding the acquisition.

Golder hopes that the island will eventually serve as an outdoor laboratory and educational site for children and adults. "You can learn an awful lot by comparing an unaltered island to developed islands," he said. "It will be an excellent control site for comparing nesting seabirds, shorebirds and migrants with other places like Topsail and Figure Eight islands." Audubon has hired a seasonal biologist to patrol the island, monitor bird populations and help visitors learn about the island's ecology.

As a state natural area, Lea Island will not contain any visitor facilities, but it will remain open to the public. "People will still be able to go to the island, but we're going to rope off sensitive areas to keep people out of the bird nesting areas," said Golder. "Once nesting season passes and the birds have fledged, we'll pull those signs up."



Source: N.C. Sea Grant

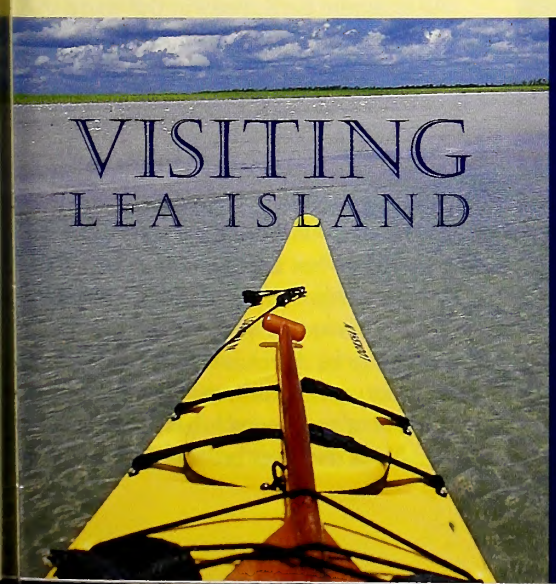
The dynamic nature of barrier islands and their inlets is clear on Lea Island. Through a combination of natural forces, New Topsail Inlet has migrated to the southwest at an average rate of more than 30 meters per year over the past century, eroding away a large portion of the north end of Lea Island.

GOING HOME

Around midday, when the number of day-trippers on the island began to grow, we returned to our boats and began our journey home. It was dead low tide as we weaved through the marsh on Howard's Creek, but our low-slung kayaks easily glided through the shallow water. The clacking calls of clapper rails resonated from the marsh grass. We caught a brief glimpse of one of those elusive marsh hens foraging on a mud flat before it darted into the greenery. Rounding a bend in the tidal creek, we flushed a great blue heron that flapped into the air, croaking like a grumpy old man.

Our marshy reverie was shattered the minute we entered the Intracoastal Waterway. As we eased into the main channel, we were sucked into a maelstrom created by fast and furious motorboats. We paddled on the edge of the channel out of the line of traffic, but we had to point our bows into the incoming wake a few times to avoid getting drenched. When my arms grew tired, I mistakenly let down my guard for just a moment. A flashy motorboat—emblazoned with the name *Jetsetter* and filled with margarita-sipping revelers—barreled by my listing kayak, spawning a tsunami-like wave that nearly swamped my boat and my pride.

In that brief moment of indignity, I felt a kinship with the migrating shorebirds and journeying sea turtles that struggle to survive in an increasingly hostile world. Every year, they must work even harder to find a refuge in this world filled with more people, more machines, more houses and fewer natural places. To them, that remote speck of sand holds oceans of possibilities. To me, it seemed so simple: We need more places like Lea Island. ⊠



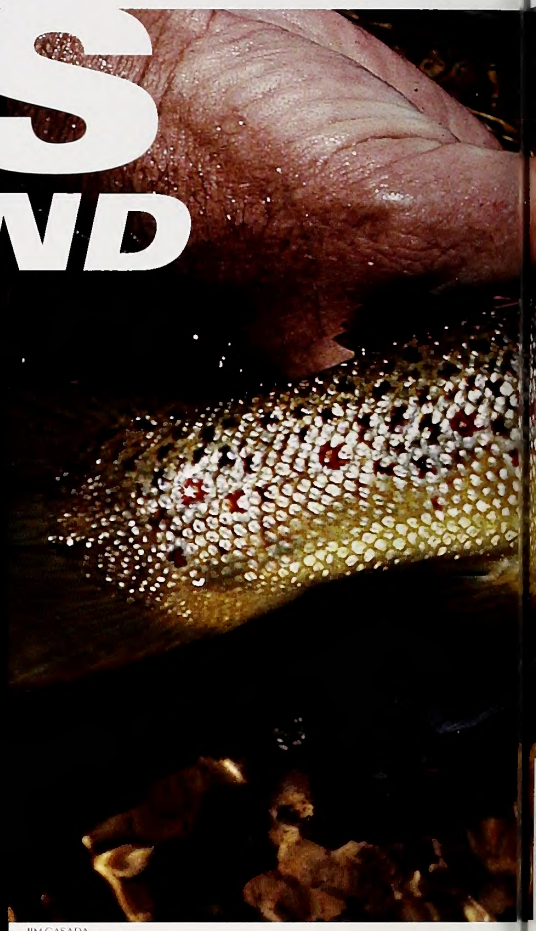
At press time, North Carolina conservation groups were working to acquire Lea Island for a state natural area that will be open to the public. The island is accessible only by boat. Visitors have to arrange their own transportation. Although there are no public boat landings near Lea Island, there are two privately owned marinas located several miles from the island, as well as several canoe and kayak rental businesses in the area.

Visitors should keep these guidelines in mind to help make the trip enjoyable and to safeguard the island's wildlife:

- There are no facilities on the island.
- Until the island is acquired by the state, please stay below the high tide line on the beach, as the higher ground is still privately owned.
- During colonial shorebird nesting season from April through August, the Audubon Society ropes off bird nesting colonies to prevent disturbance. Please stay outside these areas and keep dogs on a leash to prevent them from disturbing the birds.
- Please do not disturb any sea turtle nest sites or the island's flora and fauna.

For more information about Lea Island, contact Audubon North Carolina • Coastal Office 3806-B Park Ave. • Wilmington, NC 28403-6719 • (910) 798-8376

BUCKS AND



JIM CASADA

Torn between trout fishing and deer hunting this fall? Consider combining both pursuits in a single trip to our mountains.

F. EUGENE HESTER

Fall comes to the North Carolina high country in fits and starts. Almost imperceptibly, the dog days of late August and early September give way to Indian summer. High pressure and bluebird skies dominate the weather, and nighttime temperatures, particularly at higher elevations, begin to have some brisk bite. Change quickens as the sere fields of September yield to autumn's donning her shawl of many colors in October.

All of nature participates in this transition. For sportsmen who love to wander the steep ridges and deep hollows of the Great Smokies and the Blue Ridge, the Plott Balsams and the Black Mountains, these are weeks of wonder. Specifically, the time for undertaking two of the region's most challenging quests—lunker brown trout and trophy bucks—has arrived.

In some streams, you can fish for brown trout throughout the year. Yet there is no finer time to be astream than in the fall. The beauty of the season matches if not surpasses that of spring, and brown trout are as vulnerable as they ever become during a six-

BROWNS

WRITTEN BY JIM CASADA

to eight-week period stretching from around the last week in September through October and well into November.

There are two reasons for this. The first focuses on the spawning run of browns. It takes place at this season, and hefty browns, normally nocturnal in their feeding habits, are on the prowl during the day. Working their way upstream to headwater spawning grounds, they seek feeder streams that sometimes do little more than cover their backs. Under such conditions, the knowing angler can actually "sight fish" for the browns, picking them out with the assistance of polarized glasses as they rest and feed in the course of their migration.

Through behavioral patterns learned over countless generations, the fish sense the impending lean, mean times of winter. They feed heavily, stoking up for the rigors of spawning and of coming cold weather.

Similar factors come into play in the world of the whitetail. Cool, invigorating temperatures trigger the mating urge. Big bucks rub the last vestiges of velvet from their antlers, leaving signposts for the hunter as they do so. They also mark their territory with scrapes, providing another sign of considerable movement to the alert, experienced hunter.

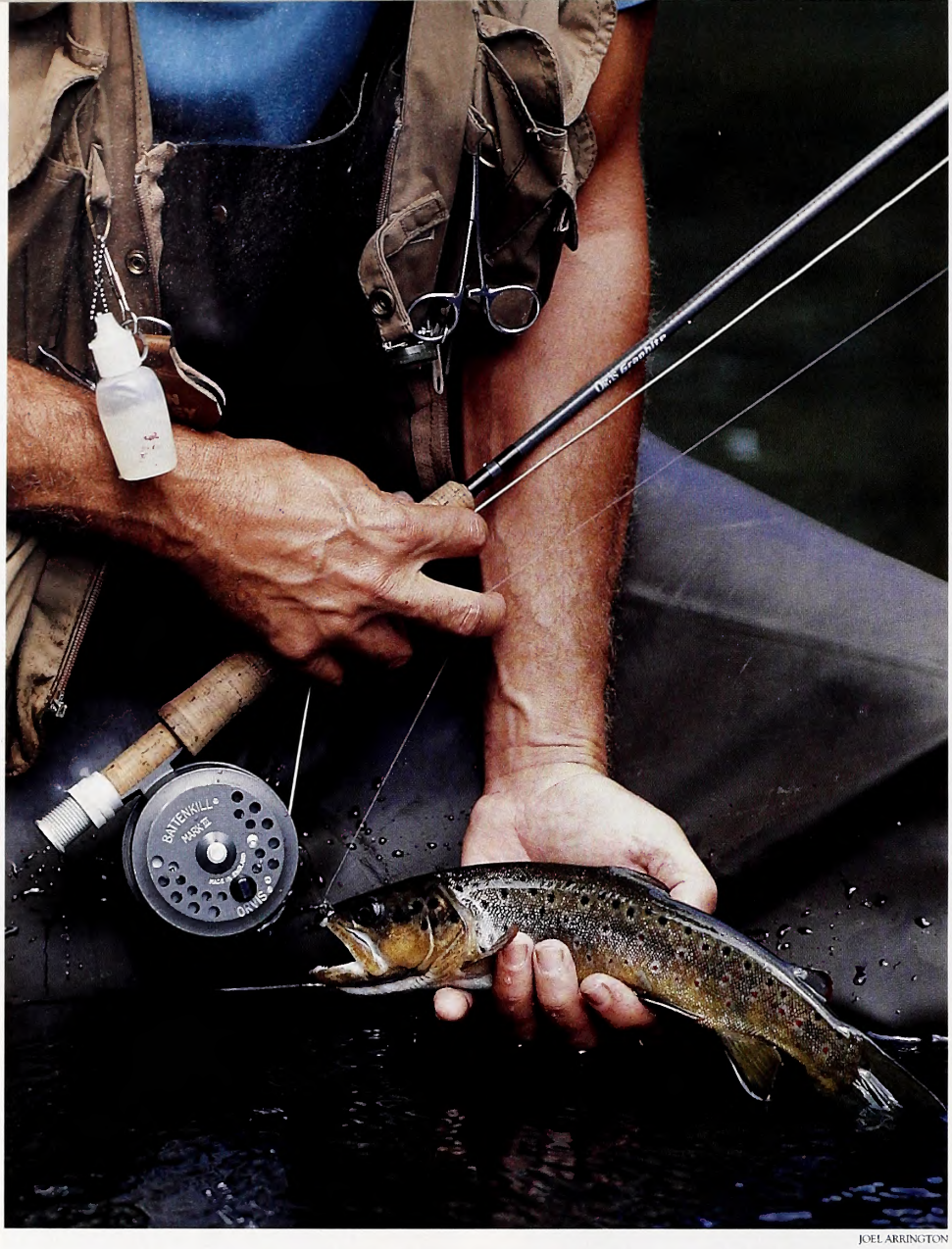
Like brown trout, whitetails feed heavily at this time. For bucks and does alike, the time of the rut is one of considerable physical rigor. In anticipation of that, the deer readily use nature's rich autumn bounty. This includes acorns and beechnuts (in the infrequent years when they produce), as well as persimmons, pears and apples where these fruits are available. Sumac and American beautyberries (also known as French mulberries) are also available foodstuffs.

As with brown trout, this activity just prior to and during the rut translates into unparalleled opportunities. At no other time during the hunting season are bucks quite so vulnerable. For those such as yours truly who have lost one corner of their sporting soul to trout and another to deer, all of this presents a delightful dilemma. It revolves around the basic question of whether to spend one's precious free hours hunting or fishing.

For those who are so inclined, particularly if they possess sufficient gumption and energy to trek into those regions, there's a most pleasant solution. Combine the pursuit of bucks and browns in the course of a single outing; or, as an alternative, do some serious scouting for deer along with making a meaningful connection with a hefty brown. Here are some thoughts on how you might go about seeking this high-country combo.

Tactics and Techniques

For most of the year, brown trout have behavior patterns remarkably like those of deer. That is to say, most of their feeding and movement comes at dawn, dusk and during the night. However, by happy circumstance, this changes in a most welcome manner during the fall. Deer continue to exhibit their preference for movement in periods of low light, except during the peak of the rut, when bucks may be found chasing does at any hour of the day. Brown trout, on the other hand, feed most actively during the middle hours of the day in the course of the spawning run.



JOEL ARRINGTON

***Like a little surf** with your turf? With proper planning, a day's hunt in the mountains can include some forays to remote streams for brown trout.*

Any lingering insect hatches are most likely to occur once the sun has warmed the water a bit. Similarly, terrestrial insects such as 'hoppers and ants do not become active until the sun warms them.

Accordingly, you have the option to mix hunting and fishing literally from first light to last. Dawn should find you positioned in a prime spot for deer. If you are backpacking, this will likely mean stalking or still hunting. Otherwise, your best bet is probably to carry a lightweight climbing stand to a likely looking spot or a site where you have already scouted and found promising sign.

Most of today's deer hunting is done from stands of one sort or another, but sometimes we forget that these devices pretty much belong to modern times. The traditional way of deer hunting, from pioneer times until the latter part of the 20th century, was afoot. If you want to get away from it all, either through long hikes or by overnight backpacking trips, try returning to the root of the sport.

Still hunting, which involves the hunter easing along, doing more looking and listening than moving, places a premium on sound woodsmanship. You have to use the lay of the land advantageously, and mountainous terrain lends itself to that. Pay particular heed to ridgelines and creek bottoms, saddles and obviously any area where there is considerable deer sign. In truth, hunting afoot—particularly when done in remote areas—can be extremely rewarding. It gets you away from the crowds, lets you see a lot of terrain and has the distinct advantage of enabling you to combine scouting with hunting.

Whether you are stalking or stand hunting, by mid- to late morning it is time to make the transition from hunter to angler. That means working your way back to camp, hunting and scouting as you go. There, you exchange your gun or bow for a fly rod or spinning gear. You might want to prepare a hot meal before venturing to the stream.

As the shadows lengthen, it is time to hasten back to camp and prepare for the afternoon's hunt. Try to stay in the woods as long as you have shooting light. Darkness comes quickly this time of year, and a good flashlight is necessary to find your way back to camp. The nights will be cool. But with a full stomach topping off a full day, you will welcome the moment when you climb into your bed or sleeping bag to dream of what tomorrow might bring.

Backpacking In

Although it is not the only way to approach this dual quest, hiking into remote backcountry areas is an avenue worth exploring. The vast expanses of the Pisgah and Nantahala national forests offer plenty of places where you can hunt and fish far from any road.

For those who opt for the backpacking approach, it is probably best to choose a campsite near a trout stream. Streams tend to be deer highways when it comes to travel patterns, and of course you will be near the trout action.

You will have to give some careful thought to the equipment you carry; climbing stands and similar accessories are pretty much out of the question. Nonetheless, a backpack carrying food and essential gear can be managed. A good tent and functional raingear are musts because you don't want to risk flirtation with hypothermia. Add your pack rod and your gun or bow, and your load will still be within a manageable 50- to 60-pound range.

Of course, should you enjoy the good fortune of taking a nice deer, a new problem will immediately present itself—how to get the venison out of the remote area where you have been hunting. In that regard, it might help to share the thoughts of one of the finest deer hunters I have ever been privileged to know, Waynesville's Joe Scarborough. An extraordinary woodsman, Joe has put his experiences serving as a sniper in Vietnam to good use in the deer woods. "I never worry about how to get a big buck

JIM CASADA

***It takes a little ingenuity** to transport a deer harvested deep in the backcountry. Using a device like the one shown, a hunter can easily wheel a deer back to his vehicle.*

out of a distant place until I've killed him," he said. "Then I've found that along with the thrill of success, the old saying of 'Where there's a will, there's a way' comes into play."

One solution is a device some mountain sportsmen describe as a "Hazel Creek buggy." This is a frame that sits atop two bicycle tires and can be pulled along somewhat like a rickshaw. Such buggies would not be suitable for use on narrow trails, but the same does not hold true for the compact, two-wheeled devices made specifically for carting deer out of the woods. They are easy to use, and you might even want to consider trying one as a replacement for your trusty backpack.

Other Approaches

An alternative to backpacking is camping in a location that can be reached by a vehicle or, if you really want to do things the easy way, staying in a conveniently located motel. You won't be able to get away from other hunters in quite the same fashion as you can when taking to the trail. But the fact that there are roughly a million acres of public hunting land and hundreds of miles of trout water in the mountains means elbow room shouldn't be a problem. You can literally drive to within a few feet of some of the state's finest brown trout water, places like the Davidson River or the upper Nantahala, and still be no more than a few miles from fine deer hunting.

No matter how you might ultimately decide to shape an outing for bucks and browns, though, the opportunities the high country provides are well worth exploring. It's rare that sportsmen can enjoy such diversity, and even more remarkable how few people combine two of the finest sporting treats the Old North State has to offer.

Equipment Needs

Your favorite bow, muzzleloader or modern rifle will take care of that part of the deer hunting equation, as will a favorite fly rod or spinning outfit when it comes to trout. In the latter case, the fly fisherman should be sure to have a good selection of streamers; some nymph patterns such as Tellicos, Gold-Ribbed Hare's Ears and Princes; and standard dry-fly patterns including 'hopper imitators, Male Adams, Royal Wulffs and perhaps some stimulators.

The same camouflage patterns you wear hunting will work quite nicely astream (although I would shed the hunter orange). Indeed, one of the most frequently overlooked aspects of successful trout fishing involves exhibiting predatory instincts. At no season of the year is a stealthy, low-profile approach more important than in the typically low water levels of fall, and camouflage attire will serve you well in this regard. Wear lightweight waders if you wish, although often midday temperatures are still warm enough for you to wade wet without appreciable discomfort. ⊠

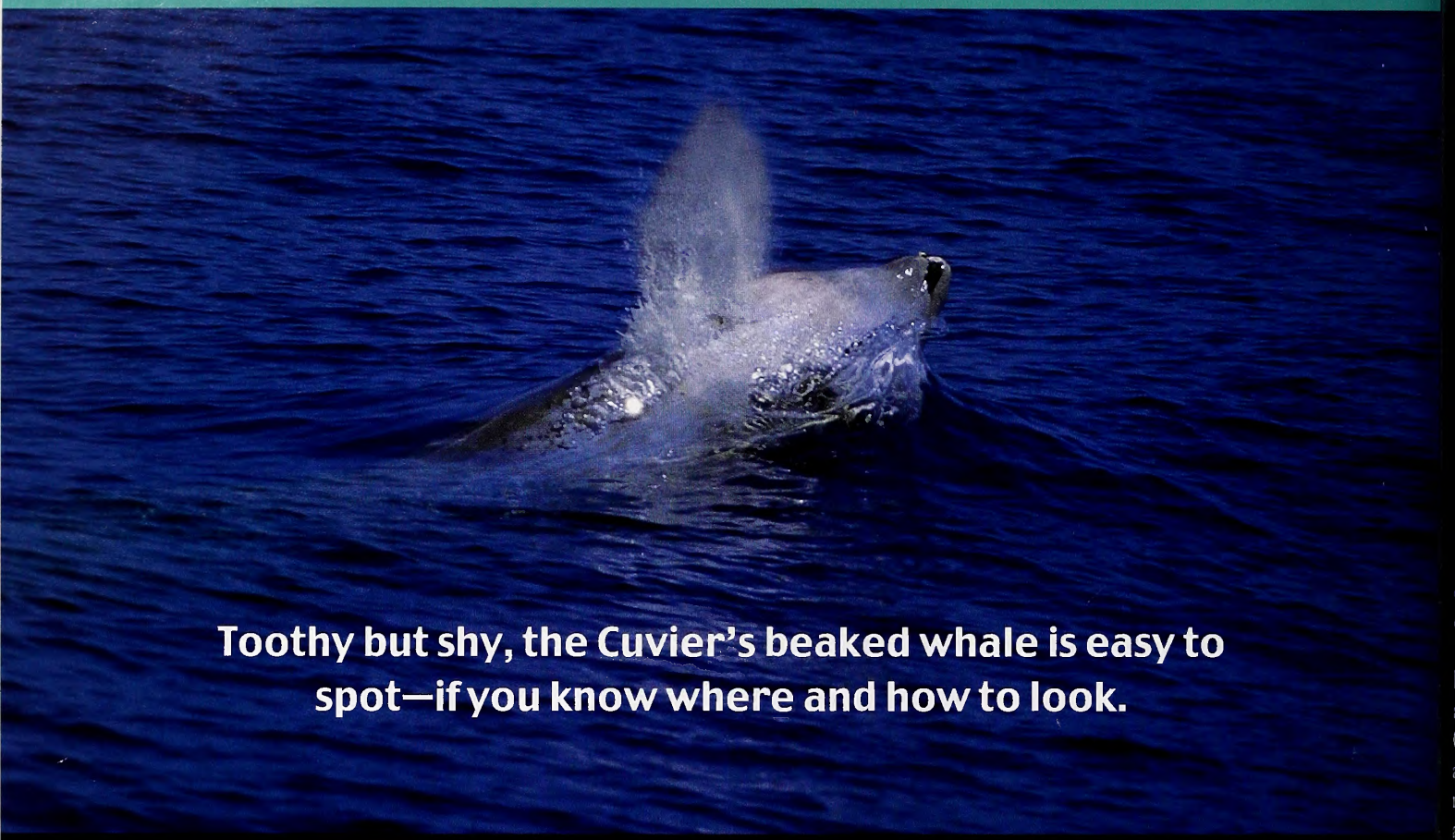
A son of the Smokies, Jim Casada is the author of Modern Fly Fishing *and* Tales of Whitetails. *He also wrote the chapter on the South for* The Great American Deer Camp.

MELISSA McGAW

***The Royal Wulff (top)** and the Tellico Nymph are two good fly patterns to bring with you on a fall fishing trip to the mountains.*

giant of the deep

written and photographed by Todd Pusser



Toothy but shy, the Cuvier's beaked whale is easy to spot—if you know where and how to look.

It was one of those rare, gloriously calm days at sea, 30 miles offshore of Cape Hatteras. Hardly a breath of wind blew, and the sea was as smooth as glass. Our vessel plowed through the Gulf Stream, along the edge of the continental shelf, in waters more than 1,000 meters deep. This deep-water domain is home to the elusive Cuvier's beaked whale.

Due to their offshore distribution and inconspicuous behavior, the 20 species of beaked whales are among the least-known, least-studied and least-understood mammal groups in the world. Much of what is known about the beaked whale family comes from the occasional beached specimen. So little is known about beaked whales that in the last 15 years, biologists have discovered two new species, and it is likely that others have yet to be found. It is amazing that such a large animal can go undetected for so many years.

Four species of beaked whales are known to occur in North Carolina's waters. They have exotic-sounding names such as dense-beaked whale, True's beaked whale, Gervais' beaked whale and Cuvier's beaked whale. Of these four species, it is the Cuvier's beaked whale that we observe most often at sea off North Carolina.

Cuvier's beaked whales can be found in all the oceans of the world. In fact, they have one of the largest distributions of any species of beaked whale.

These whales reach an average adult length of 21 feet. They are robust, spindle-shaped whales that have small pectoral fins and a small dorsal fin located well back on the body. Due to the shape of its head and mouthline in front of the eyes, this species is commonly referred to as the goose-beaked whale.

A single pair of teeth can be found at the tip of the lower jaw. These teeth erupt above the jawline and, in adult males, can be seen outside the closed mouth. The function of these teeth is not really known or understood. It is believed that the males use their teeth as weapons in competition for females, which could explain the heavily scarred bodies of adult males.

Their coloration appears to be related to age and sex. Calves and juveniles often are tan or a light brown. Older females have lighter heads, while adult males' heads may appear all white. Due to age and scarring, the backs of adult males often become lighter in color. It is because of these characteristics that we are often able to correctly identify this species of beaked whale at sea.

We generally find Cuvier's beaked whales between the 500- and 1,000-meter contour

line offshore of the Outer Banks. On calm days, we often catch the reflection of the sun shining off their backs as they slowly move through the water. Their preference for deep offshore waters may be due to the distribution of their prey. Stomach contents from Cuvier's beaked whales found dead along the shoreline have shown that they feed on deep-sea squid and deep-dwelling fish.

Beaked whales are notoriously shy of ships, but the Cuvier's beaked whales found offshore of North Carolina can often be approached by small boats. Pelagic seabird-watching trips often encounter them.

The photos shown were taken on one such trip. The animals we observed were making dives that lasted 27 to 30 minutes. The pod consisted of eight Cuvier's beaked whales, including at least four adult males. We were incredibly lucky to see them leaping clear out of the water, a behavior known as breaching. Breaching is rarely observed in beaked whales, and we do not know why they do it. Perhaps it is a form of communication. Or perhaps they do it for pure enjoyment.

North Carolina is fortunate to have a population of these unusual and mysterious whales in its waters. Cuvier's beaked whales are not listed as endangered. But as is the case for many species of whales and dolphins around the world, they face many threats—accidental capture in fishing gear, pollution and overfishing of their prey. ⊠

Whale Watching

One of the best opportunities to observe beaked whales off the North Carolina coast is by taking a pelagic trip with a local captain. Brian Patteson runs pelagic trips out of Hatteras Island and Oregon Inlet during most weekends from mid-May to late October. Though these trips focus on seabirds, whales of several species are often encountered. If you are interested in taking one of these trips, contact Patteson at (252) 986-1363 or at www.patteson.com.

Closer in, dolphin-watching trips are offered in the Hatteras area aboard the *Miss Hatteras* under Capt. Spurgeon Stowe. These trips are much shorter and stay closer to shore where bottlenose dolphins are encountered on a daily basis. To find out more about dolphin-watching trips, call (252) 986-2365 or visit www.odensdock.com.

©01

Dawgs for Southern Occasions

Down home in Dixie, there are a few things Reconstruction left alone.

written by Mike Gaddis
illustrated by Jackie Pittman

Throughout the Old South, what's left of it at least, some things just rightly belong together—grits an' gravy, New Year's an' black-eyed peas, scratch biscuits an' soppin' molasses. Nobody but a Billy Sherman Bluebelly would even argue about it.

Virginny to Alabam', Shenandoah to Savannah, there's an order to every occasion born of folkways and footpaths that's as proper as a shower on a shingle. Maybe we're 136 years the wrong end of the Late Unpleasantness, but there are a few things Reconstruction couldn't cure.

Take dawgs. By the time he's cuttin' eyeteeth, every Southern young'un worth a diaper knows you don't send a fice in a laurel holler after a b'ar. Can't expect a Yankee to figure it, but down here it ain't honorable. You have to breed up for it. Likewise, you don't expect a Trigg to traipse a swamp and tree a coon. Maybe somebody's done it, but he prob'ly eats hash browns for breakfast, too. Triggs are runnin' dogs, and folks that keep 'em wouldn't spend 'em that way. And you danged sure wouldn't go off offendin' no plantation pointer by askin' him to play second fiddle to a cocker spaniel on partridges in a pea patch. Ain't done!

If you're late of parts other than Dixie, all this is maybe a mite confoundin'. Sit a spell. Pull up a chair. If you're here to break new ground, you might as well know before you send the mule up the row—for every genuine Southern occasion, there's one best dawg to ask to the woods.

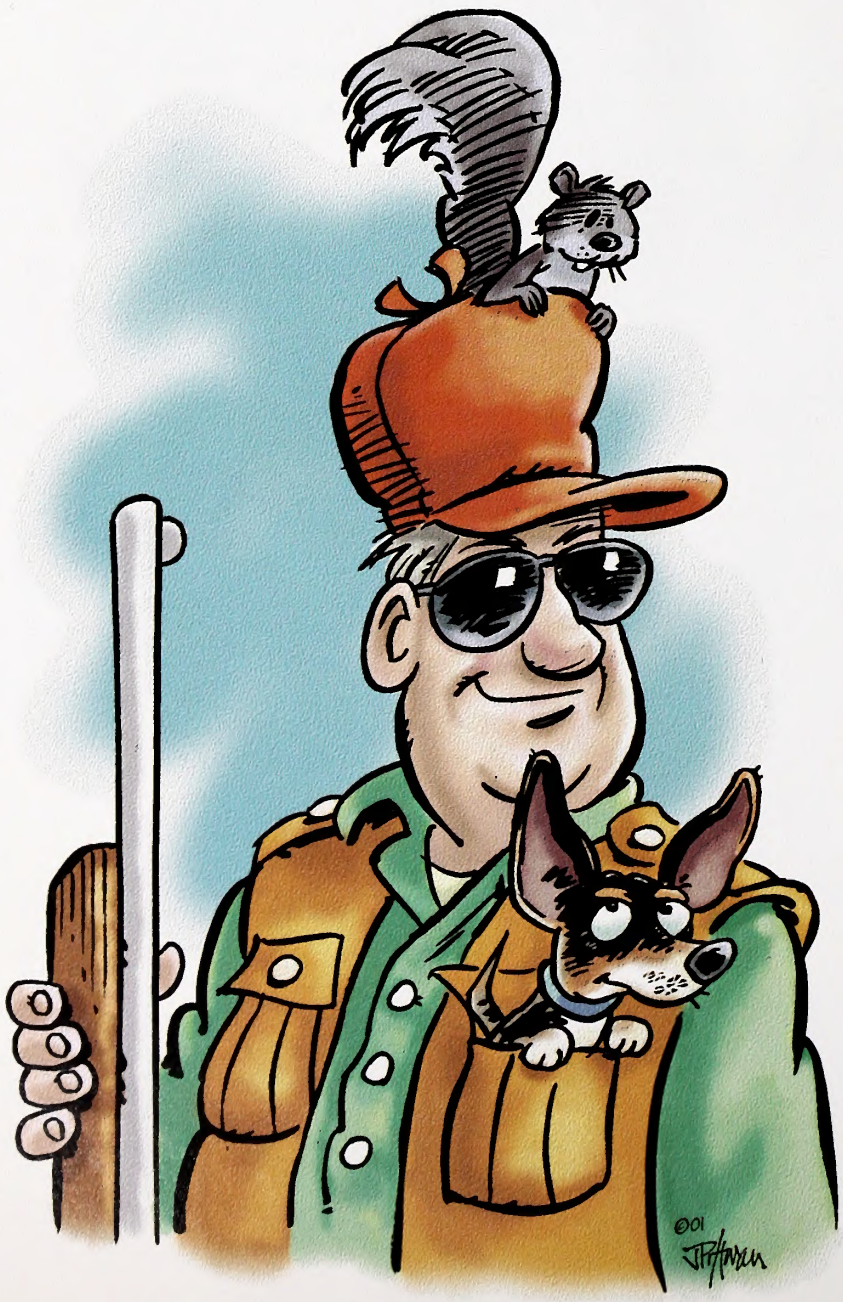
Cutovers and Cottontails

Nobody grows briers and brush piles better than us Southerners. You take a good 3-year-old cutover that's been relieved of the big pines and hardwoods so the sun can get in, and you got the fixin's for a stem-windin', crotch-scratchin' brier patch. World class. Northern folks think we do it for the timber. T'aint so. Cutovers draw cottontails—rabbits, that is. It's the only decent trade-off we Rebs get for all the Yankees comin' south and puttin' up condominiums.

Now you could throw a big hound like a black an' tan or a redbone in a cutover after a rabbit, but it's like finaglin' a date with Faith Hill and askin' her to do the supper dishes. Brier patches are thick and mean; it's better to go under 'em than through 'em. Big hounds are too tall and fast. A dawg's got to wiggle through the brush laps to rump a rabbit.

Which is why some honorary Southerner, sometime about King Arthur's time, came up with a beagle. Put a 12-inch beagle in a cutover, and the only thing more at home is the rabbit himself. Give that beagle a good cold nose and a bugle mouth, and he'll thread a brush pile and announce a bunny before you can kick a cat. Throw in behind him a pack of six or eight more with squeal, bawl and chop, and that cottontail's on the wrong side of Gettysburg. They'll bring him around just right, not too fast or slow. And if you shoot straight, something good'll make the skillet stink.

Meantime, a beagle's cute as the button on Mama's bodice and homey with the young'uns.



Hickory Holler Bushytails

A Confederate hickory tree is good for three things: a smoldering fire, hickory nuts and bushy-tail squirrels. Nary a boy in Carolina couldn't tell you that. Thing he might keep to himself is squirrels are good in a stew.

Come squirrelin' time, there's leaves on the ground—hickory, oak, maple, gum. The little devils hear you a mile and go in a hole.

Here again, you could ask a bluetick hound to the squirrel woods, but they're loud as infantry. So sometime after the War, some veterans—among 'em a feller named Thornburg—decided you could do better. They looked around the barnyard and recruited a feisty little roustabout a mite bigger than a Chihuahua, invited him to a hickory holler, showed him a tree and the varmint that lived in it. A generation or so later, they had a treein' fice—or "feist," if you got to be Baltimore proper.

Folks ever since allow it was the best thing since johnnycakes. You had a vest-pocket dawg that could tip around through the woods lighter than frost, scutter a squirrel up a tree slicker than quicksilver and chop up a bark for you to come a-runnin'. The mountain folk over in Tennessee came up with a Hoss Cartwright cousin called a mountain cur.

Blackwater Coons

Everybody that's ever carried a lantern in the woods knows a coon loves water—the blacker and swampier, the better. Put a dawg on an old coon, and he'll do the Bull Run shuffle for the nearest, deepest, wettest bottom. Before he hikes up for good, he'll tag every tree in the swamp, skin a log, swim and swaddle, stop and swat, and jump tree a time or two to boot. When you do get there, you got to trick him, shine him, squall him out. And when he comes down all ill and bothered, he ain't gonna play toesy-tag with no Jack Russell.

You got to have a scenthound as big and scrappy as he is, one that'll trail him up, take him to ride, root him up a tree—sooner's better—and chop like the hounds of Hell to keep him there.

The first Alabam' regular that tried to make a coon dawg out of a pure British foxhound found himself a

sandwich short of a picnic. Took a while to breed in some swamp savvy—a little of this an' that, a shepherd and a terrier or two when nobody was lookin'. He had himself a dawg that could fast trail like Bedford Forrest's cavalry—a tall, open-mouthed hound with a deep-holler bawl like the mournful dead that would stand tree till the cows come home and argue the bacon with the baddest boar in the bog.

Nowadays, ain't nobody gonna look down his nose at you if you let a bluetick or a redbone or a black an' tan outta the truck. Just don't pull up beside nobody with a treein' Walker.

Big Woods B'ars

Needed or not, if you were brung up in the Smoky Mountains, your grandpappy warned you twice over to "watch out fer b'ars." Bears to those of you born in the higher, lesser latitudes; they're big, toothy and ill as a bullsnake with sciatica when you get crossways of 'em. Only thing meaner is a Russky hawg.

Ol' John Plott was a German Southerner who homesteaded those hills back in 1750, before Washington wore a wig. When he crossed the Water, he had gumption enough to bring his hawg dawgs along—bred 'em blue, right on down the line, till his son snuck off and siphoned in a little "spotted leopard" hound from a feller across the Georgia line.

Then and now, ain't no b'ar in the woods can shake a good pack o' Plotts. They're fast and they'll stick—push that b'ar past his patience and grab fur till the varmint comes to bay or climbs a tree. Then they'll chop like a banshee and tell him what for. And if there's mixin' to be done, they're quick as a rail lizard and tougher than a lighter knot. Ain't no gamier animal this side of Purgatory.

Rumor was, Stonewall Jackson had some Plott in him at Fredericksburg.

The folks in Carolina hauled off and hoisted the flag one day in '89 and made the Plott their state dawg. If it'd come to vote, there'd be one in the Governor's Mansion.

High-Bald Foxes

When the reds are stirrin', you got to get up high where you can hear, like the Yanks did at Big Round Top. Build up a good, warm sittin' fire on some bald knob on a damp, moonless night when the wind's south and the earth's breathin'.

Bring your best hounds, 'cause your friends are goin' to be there, and it's a sight bet they'll have theirs. When you turn 'em out, it'll be root hog or die to see which ones run true. You got your pride ridin' on their backs and faith in your overalls pocket that they'll bugle when the fox gets good and sweet, and the race goes ripe as squishy mush melon.

They'll hold true 'cause you bred 'em that way from the pick of the line—right down from the gamey, high-bawlin', clear-mouthed, good sense dawgs ol' Thomas and John Walker whittled out of English stock back in Virginny and Kentucky. Bred 'em that way right on down the pike, you have, and they'll stay, stay strike and stretch on the canniest old fox in the woods till the critter runs to ground. They're strong, prideful, stand-on-their toes, saber-tailed dawgs that'll put your heart in your throat when they carry him to ride. They're Walkers, purebred, and there ain't none better.

Deer in the Flatwoods

Across a mite smart of the South, a piece east of the hills and west of the salt, there's a stretch of country leans to flat. You can stand square to the middle of it and do good to see to either side. And the sky's big enough, it can rain on one end and shine on the other. These are woods so big and tight, the sun doesn't see the ground. There are swamp bogs and catbriers and fire-thistle and skeeters and cotton-mouth water moccasins, and it's no fittin' place for neither polite folks nor Republicans.

But the deer are thicker than the fleas on a farm-yard shepherd—bucks with horns on 'em like rockin' chairs. And there ain't but one way to get 'em. You got to send a no-nonsense runnin' hound in there that's tough and leggy as the country, and ask him to trail 'em up and prod 'em out. When folks in those parts finished shoppin' around for a proper pack of flatwoods deerhounds, they figured Col. Trigg did it somewhere closer to right.

Ain't the deer been born can outdo or outlast a seasoned Down East Trigg. He'll push 'em fast, hard and long with a clear, short voice loud enough to wake the dead—and never back up doin' it.

The one thing grittier than a no-quit Trigg is a good dozen of 'em. ⊠

To learn more about Southern sporting breeds, consider the new poster on page 37.

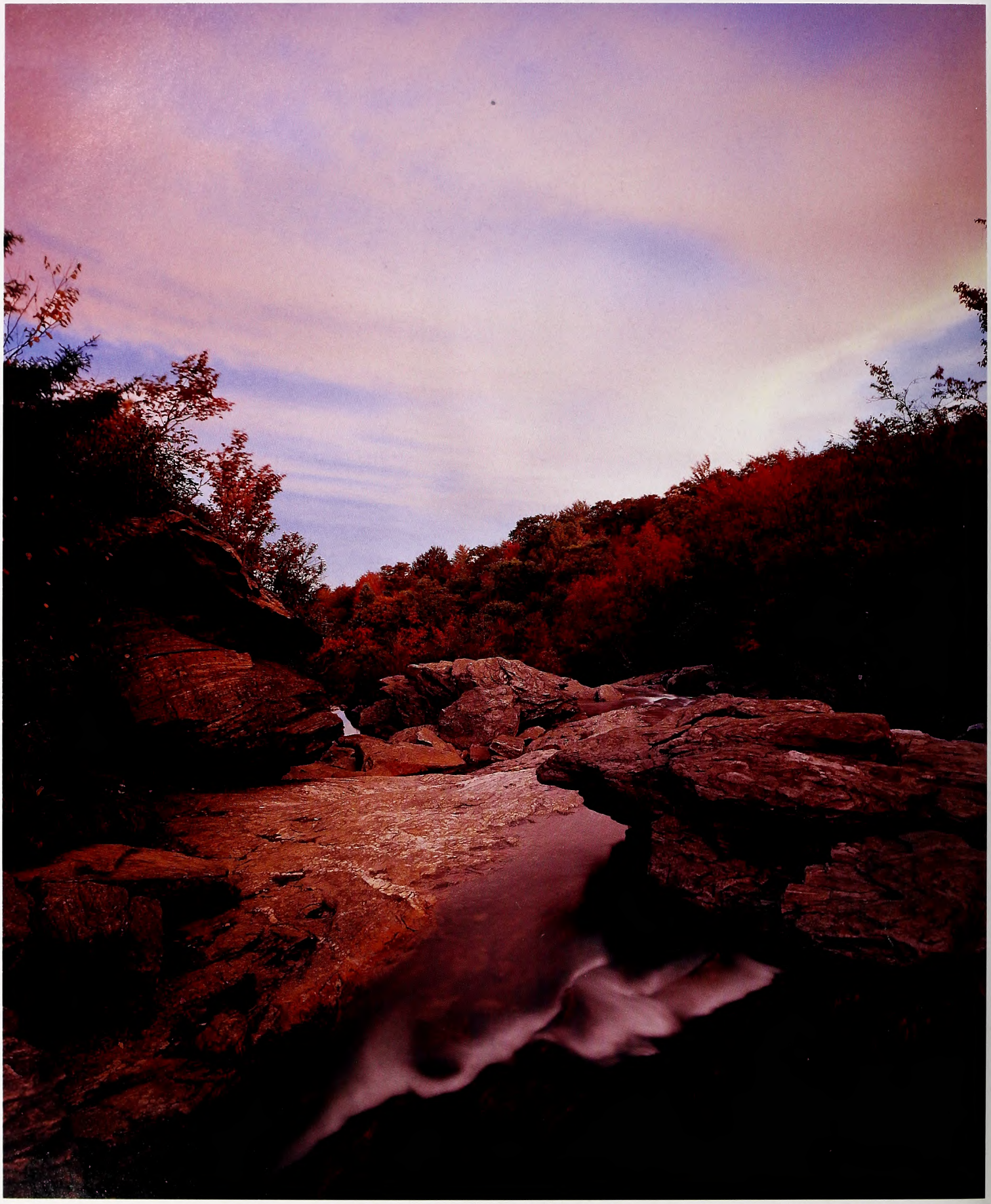
HUES OF

AUTUMN

PHOTOGRAPHED BY GEORGE HUMPHRIES

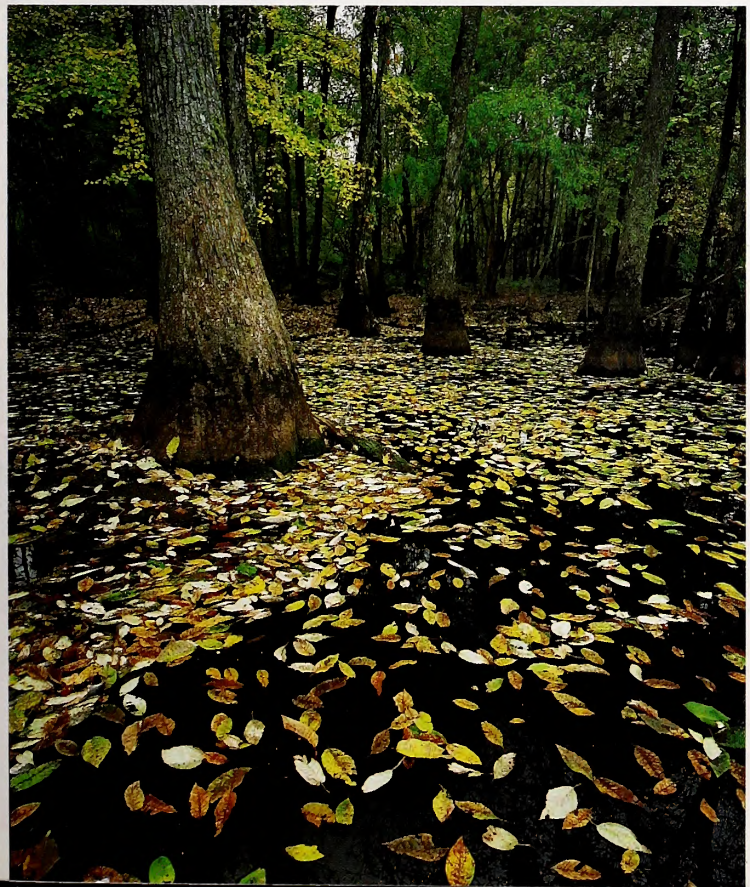
FALL REVEALS ITSELF IN A MYRIAD OF COLORS ACROSS NORTH CAROLINA'S LANDSCAPES.

PRICE LAKE, WATAUGA COUNTY



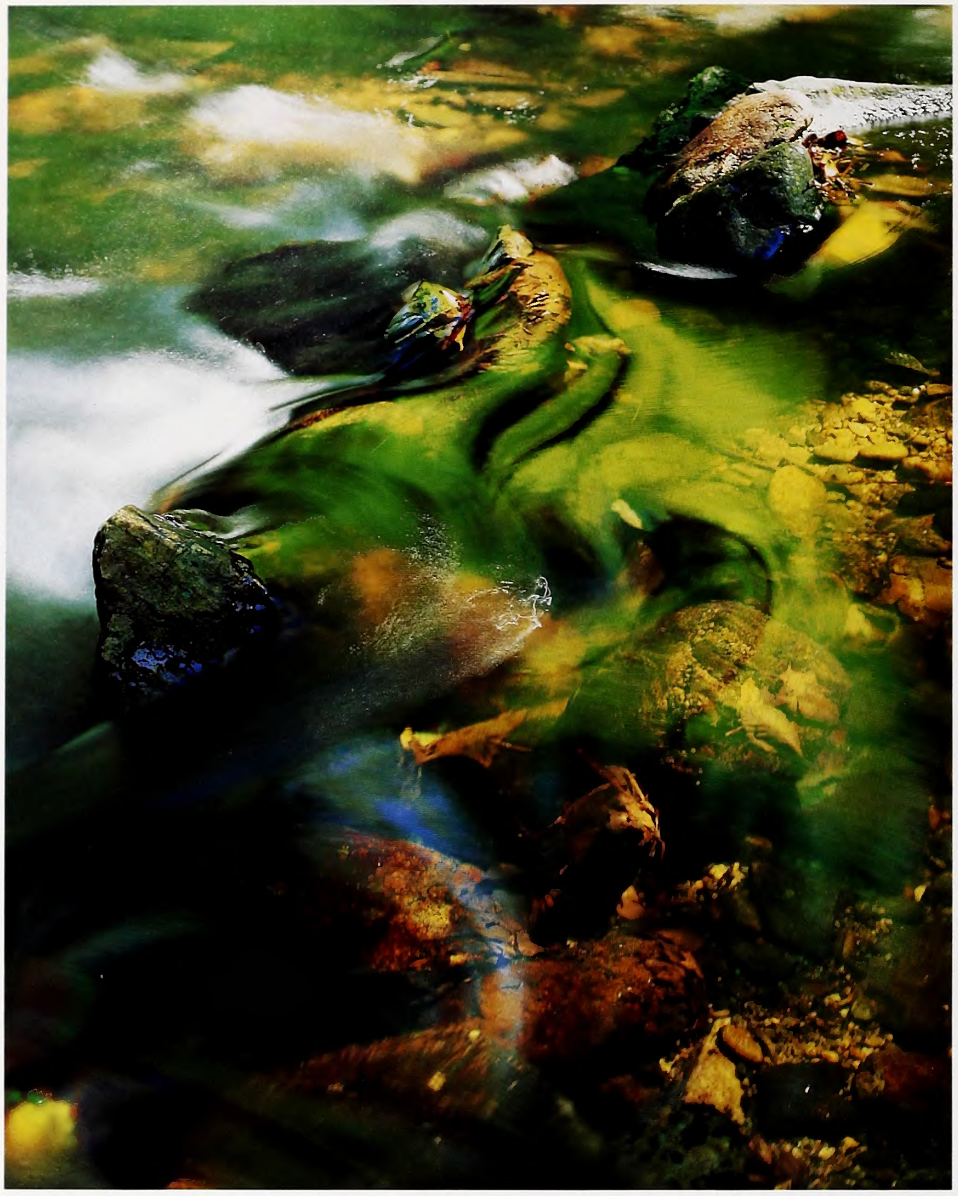
PIGEON RIVER HEADWATERS, HAYWOOD COUNTY

LAKE MATTAMUSKEET, HYDE COUNTY



RED, ORANGE, YELLOW AND GOLD—THE COLORS OF FALL LEAP FROM NATURE'S CANVAS SIGNALING THE ARRIVAL OF THE GLORIOUS SEASON.

MERCHANTS MILLPOND, GATES COUNTY



Davidson River,
Transylvania County

Alligator River, Tyrrell County

HATTERAS SHORELINE, DARE COUNTY

CRISP AIR, COOL WATER AND VIVID COLORS ARE THE HALLMARKS OF FALL. FROM THE MOUNTAINS TO THE SEA, THE HUES OF AUTUMN STIR THE SOUL TO GET OUTSIDE AND EMBRACE THIS WONDROUS TIME.

Stand Safely

The real danger with tree stands is climbing. Here's how you can be safe.

written by Brad Deen
photographed by Jody Duggins

When Greg Rapier fell while hunting, he decided to build a better tree stand.

It was a cold mountain morning in 1994. Hunting by himself in Alleghany County, Rapier was climbing up to his stand when a screw-in step gave way. He dropped 30 feet to the ground, which was frozen hard in the 17-degree weather. Somehow, he walked away with a sore shoulder.

"It happened on a Friday, and I went to work on Monday," he said. "Through no skill of my own—the will of God—I suffered no permanent injuries. It scared me to the point where I realized I had to do something."

With his business partner, an engineer, Rapier applied his background in utilities construction toward designing a safer tree-climbing system. Marketed as Guardian and sold though Mocksville-based Cranford Manufacturing Inc. (www.ezyclimb.com), it started with the climbing rig.

"The fallacy of most safety systems is, you can't use it until you get into the stand," said Rapier, a certified hunter safety instructor. "That's what I call their dirty little secret."

Most stand-related falls occur outside the stand, according to a nationwide survey by *Deer and Deer Hunting* magazine. One of the few attempts to document the problem of stand safety, the 1993 survey of hunters found that 70 percent of falls occur while the hunter is climbing up or down the tree or while entering or exiting the stand. Sleeping in the stand was a factor in only 3 percent of falls.

The problem may not be the equipment itself so much as individual behavior.

"For years, the hunter education people have been telling them" to wear a climbing harness, said John Woller, president of the Tree-stand Manufacturers Association, a membership-based trade group that inspects and certifies stands for safety and load-bearing standards.

Wildlife Enforcement Lt. Mike Bogdanowicz, pictured, advises stand hunters to keep a clear, unobstructed view.

Woller, also the founder of stand maker Summit Specialties of Decatur, Ala., said several manufacturers are making a full-body climbing harness standard equipment with their stands, yet many hunters still don't wear them.

"A lot of hunters say, 'I use it. I use it,'" he said. "If these people had had a belt on, the ground wouldn't have stopped them."

The magazine survey indicated that although 40 percent of stand users will fall at some point in their hunting lives, a full two-thirds of them never wear a belt or harness while climbing.

"That's a cause for great concern," said Lt. Mike Bogdanowicz, hunter safety coordinator for the N.C. Wildlife Resources Commission's Enforcement Division.

"Discomfort or perceived discomfort," Bogdanowicz said, is one reason many hunters cite for disregarding a safety harness.

Habit is another. "It takes a minute or two to put on a harness when you're climbing," Bogdanowicz said, "but once a hunter gets into

a habit of using a harness, it becomes second nature. The problem is that many hunters have developed the bad habit of not wearing a harness until they're in the stand."

Lack of information may be another factor. Hunter safety courses typically cover only the basics—that a hunter is safest when harnessed while ascending and descending the tree and while occupying the stand. What kind of harness to use and how to use it are not spelled out in any written curriculum in use across the nation, said Bogdanowicz, who coordinates the North Carolina courses.

"It's not at the level of detail that it should be addressed," he said. "It's something we need to look at."

Hunter safety courses are required of young or new hunters. To reach those who have not taken the course in several years, the Wildlife Commission has printed a pocket-sized pamphlet containing stand tips with a guide for determining deer's age based on teeth and jaws.

Even hunters who know the risks, however, often don't follow safety rules or make the effort to obtain the correct gear, said Bogdanowicz, who chairs a national task force of hunter educators trying to determine why this is so, and what can be done to correct it.

"Now, there's been a lot of advancement in tree stand safety because of the injuries and falls," he said "but it's still got a long way to go."

Even the best full-body rig requires a safety rope plus a friction-based stopping attachment—either a locking pulley or a special prussick knot—to clip onto while climbing. Such items are not readily available at most hunting and sporting goods stores, although retailers can probably order them. Specialty catalogs are a good source of safety equipment, as are outdoor adventure stores that sell mountain- and rock-climbing gear.

Safe climbing isn't cheap. Depending on the model and seller, you'll pay up to $100 for a full-body harness and accessories. "The cost of a quality harness pales in comparison to a back injury and missing six months at work," Bogdanowicz said. "They make a nice Christmas gift or birthday gift. Spouses, parents and children of hunters should ask the question: 'Are they wearing an adequate full-restraint system?'"

Encouraging tree-stand safety is like having drivers buckle up.

"A seat belt is something that's mandated by law and proven to save lives, and you still don't get 100 percent [compliance]," Bogdanowicz said. "It's a habit, like anything else." ⊠

General Stand Safety Tips

Never hunt while under the influence of drugs or alcohol.

Always tell someone where you are hunting and when you expect to return. Map your whereabouts and leave a note at camp, at home or in your car.

Attach the stand securely using correct hardware.

Test your stand before going into the field. Attach it to a tree a few feet off the ground. Climb into it—hard. Shift your weight.

Never jump or bounce to "seat" the stand to the tree. You could unseat it.

Test your range of motion. Swivel around as you hold a bow or rifle to make sure nothing hinders movement.

Choose a straight, healthy tree.

Make sure your stand comes with proper safety equipment: a full-body harness, a double-locking lanyard, a climbing strap or rope, a haul rope and any necessary accessories.

Scout the tree for bee or wasp nests, animal dens and overhead deadwood

Remove all logs, rocks and other hard objects on the ground below the tree stand.

Never climb a stand in high winds, or when snow or ice is present.

Step slowly into any tree stand, applying weight gradually first with one foot, then both.

Never stand on the seat.

When you are through hunting, take your stand with you.

Read all equipment instructions carefully.

Check your stand before each use for wear, deterioration, missing parts or other hazards.

Avoid sleeping in the stand. If you feel drowsy, climb down immediately.

Climb higher than the stand and step down onto it. Climbing up onto the stand can dislodge it.

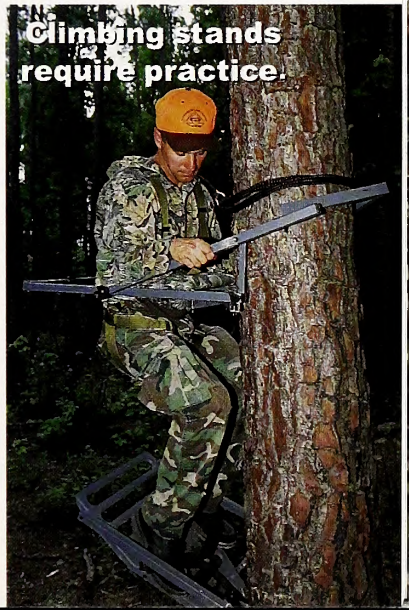
Self-Climbing Stands

Unlike stationary stands, self-climbers don't require a ladder or screw-in steps to climb the tree. They are portable and allow you to hunt different locations. A disadvantage is that you can't climb above branches.

Make sure your feet are strapped into the bottom piece correctly.

Are you comfortable with the climbing motion? Do you have the physical strength and endurance for it?

Tie both sections together, making sure neither can slip out of your reach.



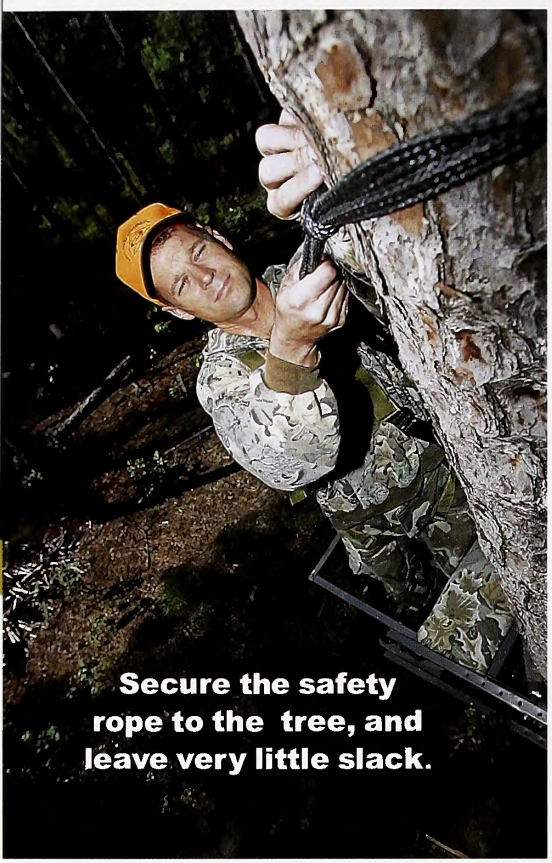
Climbing stands require practice.

Homemade or Permanent Stands

Unless you are an accomplished carpenter, welder and design engineer, it is not advisable that you build your own stand.

Some landowners don't allow permanent stands, and most public lands forbid them.

When removing a permanent stand, make sure all nails are pulled out. Sawmills use scanning equipment and reject trees found to contain steel nails, which reduces the value of a landowner's timber. Some hunters prefer to use heavy-duty aluminum nails that do not damage saw blades.



Secure the safety rope to the tree, and leave very little slack.

Stationary Stands

If the stand is the portable type, make sure you can climb with it strapped to your back. Can you climb to your hunting height without tiring, or should you find a lighter model?

If it attaches around the tree with small bolts or nuts, carry extras in your pocket. Considering that most falls occur outside the stand, climbing down just to retrieve a wing nut—assuming you can find it in the predawn darkness—places you at additional risk.

If you use a ladder to climb into your stationary stand, do not allow the angle to exceed the manufacturer's recommendations. Secure yourself to the tree in case the ladder tips over while you are climbing. Have another way down.

If you climb with a lineman's belt, it is imperative that you have a backup, such as a rope. Detaching yourself from the lineman's belt to climb into the stand—or climbing out before attaching the belt—leaves you vulnerable to losing your grip. A lineman's belt also prevents you from climbing above branches, which is one of the advantages of a stationary stand.

A double lanyard clips to the harness twice.

Harnesses and Lanyards

Never climb without being securely attached to the tree with a harness, lanyard and rope.

Waist or chest belts can cause serious internal injuries. A fallen hunter can dangle upside down, which makes freeing oneself difficult and can cause suffocation in seconds.

A full-body harness—which straps like a parachute harness around the shoulders, chest and upper thighs—distributes the impact of a stopped fall evenly across the body, reducing chances of injury. The faller usually remains upright.

If you fall, try to get back into the stand immediately. You can suffocate in minutes, even with the best harnesses.

Buy components with the highest tested weight that you can find. A 250-pound hunter who falls 6 feet and stops suddenly will generate 1,700 pounds of force.

Look for straps and belts at least 3 inches wide.

Find a harness with a little give, such as nylon, that will keep those sudden stops from being so sudden.

Leave a foot or less of slack in the lanyard—just enough to sit or stand. A longer plunge creates greater force, heightening the risk of injury when the restraint catches.

Make sure the lanyard is no longer than 3 feet, which will keep slack to a minimum.

A double or forked lanyard will allow the climber to unhook while stepping into or out of the stand, yet remain securely attached. This feature is also handy when climbing above branches. Simply disconnect one clip, reattach it at the higher point and repeat with the second clip.

Adjust the harness for maximum comfort. Give yourself as little excuse as possible not to wear it.

Ropes and Accessories

Never climb while carrying your weapon or equipment. You will need both hands in case your foot slips.

Tie one end of a haul line to your belt loop and the other end to the items on the ground. Once you are secure in the stand, hoist up your equipment.

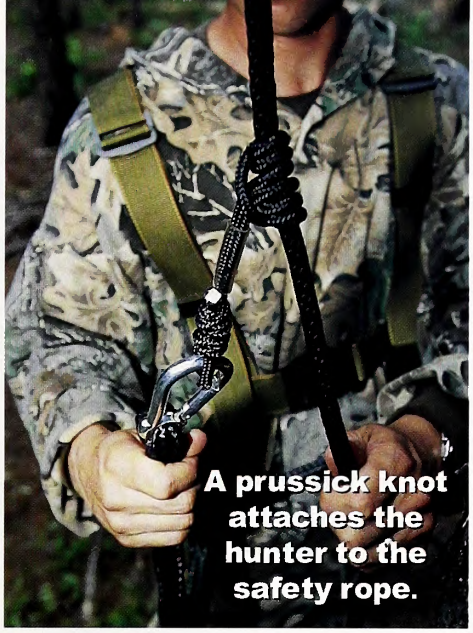
Leave your equipment a few feet away from the bottom of the tree, so that if you do fall, you will not cause further injury to yourself. When lowering equipment from the stand, swing it to the side.

Haul up firearms with the barrel pointing down. Cover the muzzle to keep out moisture, dirt and debris.

Always unload firearms before pulling them up to the stand.

Haul up bows with arrows always in a covered quiver.

Simply tying a rope to a tree is not enough. Attach your lanyard to the rope with a friction-based stopping mechanism, such as a locking pulley, or learn to tie a mountain-climbing prussick knot **(www.realknots.com)**.



A prussick knot attaches the hunter to the safety rope.

Screw-in Steps

If you use screw-in steps, inspect them for rust, warping or dulled threads.

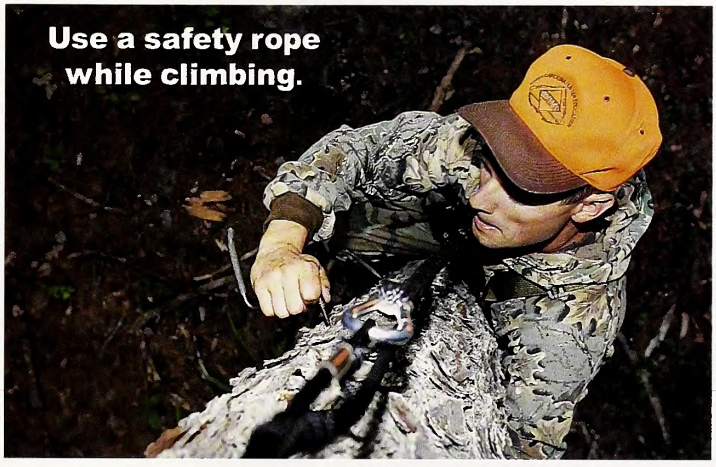
Have enough screw-in steps so that the distance between them is comfortable.

Never screw a step into an existing hole.

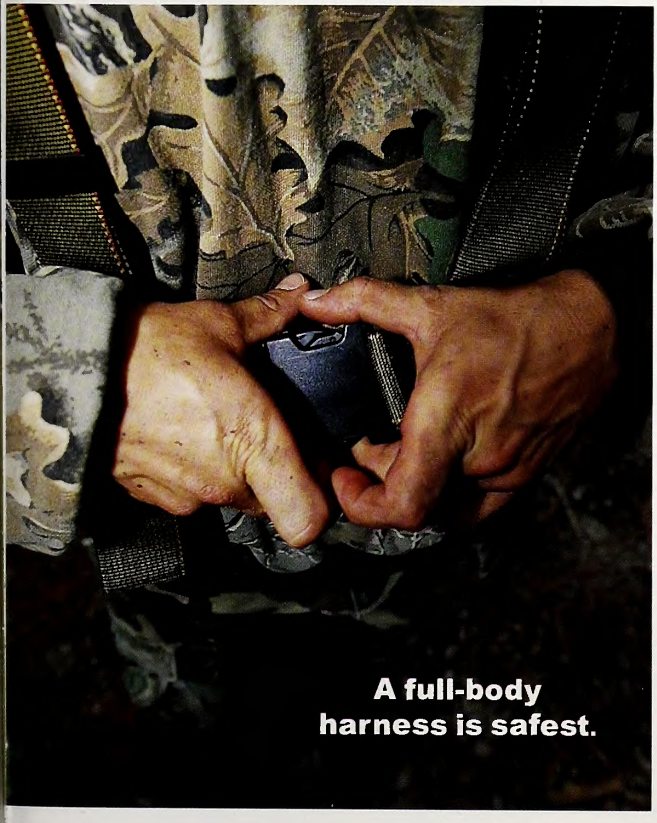
If you use a cordless drill to start the holes, make sure the bit is smaller in diameter than the steps' threads.

Make your last two steps even. This allows you to hang your stand, climb in and out and take it down with equal pressure on both legs.

Never leave steps in a tree beyond the season. They can weaken the tree and create a hazard for loggers.



Use a safety rope while climbing.



A full-body harness is safest.

By the Numbers

Tree stands accounted for one-fourth of the hunting accidents in North Carolina during the past 10 hunting seasons.

Compiled by the N.C. Wildlife Resources Commission, safety reports for the hunting seasons 1989-90 through 1998-99 counted 110 tree-stand-related accidents. Ten of these were fatal. Hunting accidents from all causes—from failure to wear blaze orange to unsafe handling of firearms—totaled 428 over the same period, 48 of which were fatal.

Falls while climbing or from not wearing a harness were responsible for at least 64 percent of all stand-related accidents during the last 10 seasons. The true percentage is undoubtedly higher, but state hunter safety reports prior to the 1994-95 season do not subdivide stand accidents by cause. For the five seasons of detailed accident reporting, falls while climbing or from lack of a harness accounted for 70 of 71 stand-related mishaps.

Two stand fatalities involved self-inflicted gunshots. These occurred when the hunter either didn't use a haul line to bring a firearm into the stand, or used a line but left the muzzle pointing up.

And these are only the reported accidents. Not all falls, especially those not requiring an emergency room visit, are reported to the Wildlife Commission.

Hunting remains one of the safest of all recreational activities, according to the National Safety Council, producing 7.06 injuries per 100,000 participants. That compares to 3,313.48 injuries per 100,000 participants in football, almost 500 times the injury rate among hunters. Bicycling has an injury rate 168 times that of hunting. Even swimming produces 27 times as many injuries per capita as hunting.

grapeleaf skeletonizer moth

If night was day and day was night,
If the hours of dark were the hours of light,
Our skies would show us amazing sights:
The owls, the bats, the fly-by-nights.

The owls would swoop before our eyes,
While hungry bats gobbled flies.
And for each butterfly asleep in bed,
Ten moths would flutter by instead.

The Fly-by-Nights

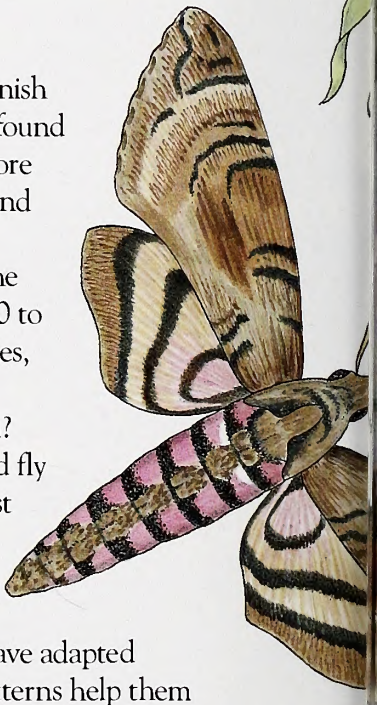
written by Terry Krautwurst / illustrated by Consie Powell
nature activity by Anne M. Runyon

giant leopard moth

Think of a moth, and you probably picture a small, brownish insect flying near a porch light. But think again: Moths are found in all sorts of colors, patterns, sizes and shapes. There are more **species** of moths than all the species of birds, fish, reptiles and mammals combined.

Moths and butterflies belong to the same insect group, the Lepidoptera. But moths outnumber butterflies more than 10 to one. In North America there are at least 11,000 moth species, compared to only 750 kinds of butterflies.

So why do we notice butterflies more often? Because butterflies are bright and colorful and fly about during the day, when we're awake. Most moths are **nocturnal**. They come out only at night, when we're indoors or asleep. In daytime, moths hide, resting quietly on tree trunks or amid leaves or bushes. Many have adapted **camouflage**. Their subtle colors and wing patterns help them blend into their backgrounds by imitating bird droppings, leaves, lichens or tree bark. They're hard for birds and other predators—and people—to see.



Underwing moths have such sensitive ears that they can hear an attacking bat's high-frequency "radar"—often (but not always) in time to avoid being eaten.

bad wing

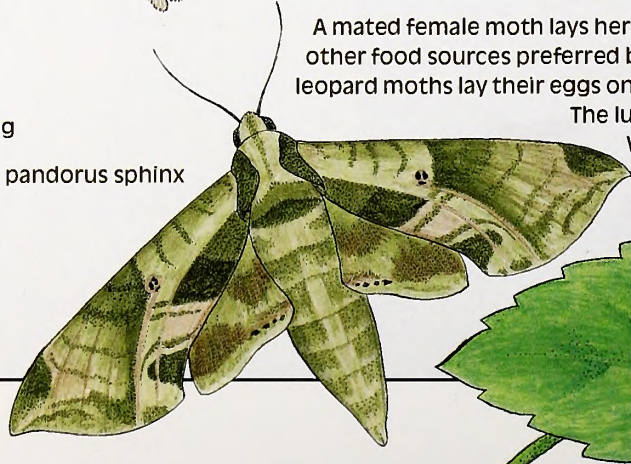
ilia underwing

If a bird comes too close to an underwing moth, the moth suddenly lifts its dark, hard-to-see top wings and flashes bright red- or orange-striped bottom wings. The trick startles the bird long enough for the moth to escape.

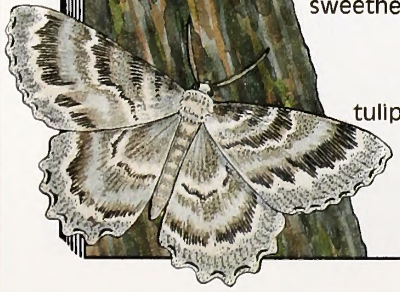
sweetheart underwing

webbing clothes moth

A mated female moth lays her eggs on the kinds of plants or other food sources preferred by caterpillars of her species. Giant leopard moths lay their eggs on dandelion or honeysuckle leaves. The luna moth favors hickory leaves. Wax moths lay their eggs in bee-hives. A clothes moth may choose your favorite wool sweater.



pandorus sphinx

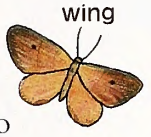


tulip tree beauty

grapevine epimenis

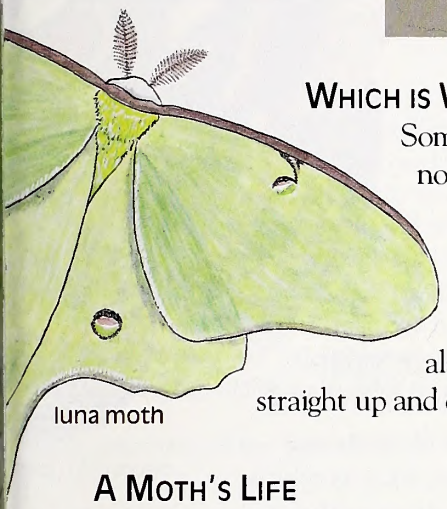
WHICH IS WHICH?

Some moths fly during the day, and some butterflies are not brightly colored. If it's not nocturnal, how do you tell a moth from a butterfly?



orange wing

Most moths have fat, furry bodies; butterflies are usually sleek and slender. Butterflies have thin antennae that become rounder at the end, like little clubs, or that curve back like hooks. Moths have thicker, feathery antennae that almost always come to a point. The two also hold their wings differently. A butterfly resting on a flower holds its wings straight up and down. A moth at rest folds its wings flat over its body or out to the side.



luna moth

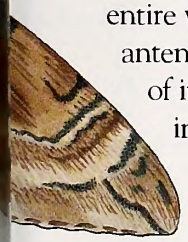
A MOTH'S LIFE

Moths, like all lepidoptera, begin life as eggs and go through a series of developmental stages called **complete metamorphosis**. Each egg hatches into a small larva, or caterpillar. The caterpillar spends days or weeks, depending on the species, eating from its **host plant**. Moth caterpillars grow so rapidly they must molt, or shed their skin, several times to make room for their bigger bodies.

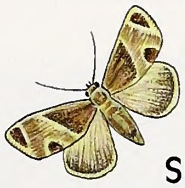
Once fully developed, a moth larva is ready to become a pupa. During this stage it rests, not eating or moving, and slowly changes into an adult moth. Sphinx moth larvae burrow underground and harden into pupae. Many other moths pupate inside a cocoon made of leaves, or of silk they spin around themselves. The polyphemus caterpillar wraps itself in a leaf, then ties its "blanket" with silk.

Some moths pupate for only a few days. Others sleep through an entire winter. Meanwhile, the moth's body changes. It grows wings, antennae and internal organs. When it's ready, the insect pushes out of its enclosure. It slowly flaps droopy, shriveled wings to pump blood into them. Gradually the wings stretch to full size and stiffen. The moth flutters away to find a mate.

polyphemus moth



pinkspotted hawkmoth



slug moth

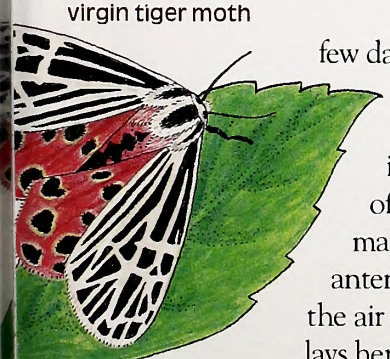
A male polyphemus moth can find a female from as far away as five miles.

SUPER SCENTS

An adult moth's life is short—usually just a few days. Its entire purpose is to mate. Some species don't eat or drink; others sip nectar or water.

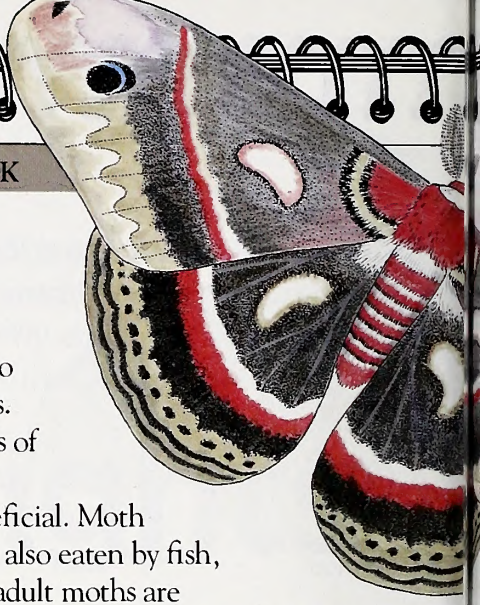
How do moth mates find one another, especially in the dark? The female stays in one place and gives off a special scent, called a **pheromone**, that attracts males of her species. Sense organs on a male's feathery antennae detect tiny traces of the pheromone wafting in the air that lead him to a female. After they mate, the female lays her eggs, and the cycle begins again.

virgin tiger moth



In its first nine weeks of life, the larva of the polyphemus moth eats 86,000 times its own birth weight in oak, hickory or other leaves. It grows to 3 inches long and as big around as your finger.

The io moth has a surprise for predators. When it pulls the forewings forward it reveals two large spots that resemble scary animal eyes. Boo!



cecropia moth

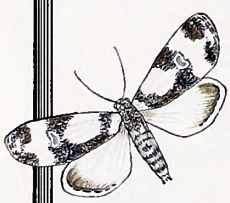
PARTLY FOE, MOSTLY FRIEND

In their caterpillar stage, some kinds of moths are serious pests. Farmers can suffer great losses from such moth larvae as tomato worms, corn earworms and peach tree borers. Gypsy moth larvae have damaged thousands of acres of eastern forests.

Most moths, though, are harmless and beneficial. Moth caterpillars are the main food of songbirds and are also eaten by fish, reptiles, bears, rodents and other insects. Countless adult moths are consumed by birds and bats. And nectar-feeding moths, such as sphinx moths, **pollinate** many flowers. Without moths, some plants might eventually go extinct.

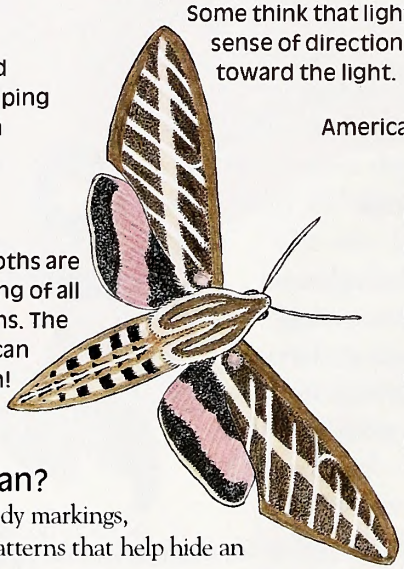
Why do moths fly to bright lights? Lepidopterists aren't sure, but most agree that moths aren't so much attracted by intense light as they are confused by it. Some think that light may disrupt a moth's sense of direction, causing it to turn toward the light.

Moths and moth caterpillars are important foods not only for birds and bats but also for many other creatures. Copperhead snakes eat the larvae of imperial moths, royal walnut moths and others.



tufted bird-dropping moth

American ermine moth



Sphinx, or hawk, moths are among the fastest-flying of all butterflies and moths. The white-lined sphinx can zoom up to 30 mph!

What Does It Mean?

camouflage: natural body markings, shapes, colors and patterns that help hide an animal from predators

complete metamorphosis: the different stages (egg, larva, pupa, adult) that moths and many other insects pass through as they develop

host plant: plant on which a female insect lays her eggs and on which the larvae feed after hatching

nocturnal: active at night

pheromone: a chemical given off by an animal or insect that affects the behavior of another animal or insect of the same species

pollinate: to transfer pollen (the male part of a flower) to the ovule (female part of a flower), which is necessary for reproduction in many plants

species: a single kind of organism (such as a plant, insect or animal) unlike any other

Read and Find Out

- *Butterflies and Moths* by Barbara Taylor, DK Publishing, 1996.
- *A Field Guide to the Moths of Eastern North America* by Charles V. Covell Jr., Houghton Mifflin, 1984.
- *Peterson First Guide to Butterflies and Moths* by Paul A. Opler, Houghton Mifflin, 1998.
- *Peterson First Guide to Caterpillars of North America* by Amy Bartlett Wright, Houghton Mifflin, 1993.
- *Wings of Paradise: The Great Saturniid Moths* by John Cody, The University of North Carolina Press, 1996.

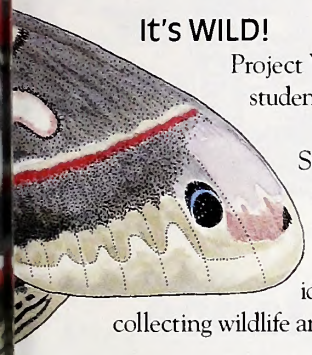
In *Wildlife in North Carolina:*

- "The World is Full of Moths" by Harry Ellis, November 1998.

Get Outside

Go Moth Watching: Look for day-flying sphinx moths around flowers in meadows and yards. Bright lights near campgrounds and in parks are good places to search for underwings and giant silkmoths (such as the luna and cecropia) at night. Use binoculars to get a close look. A field guide can help you figure out what kinds of moths you've found.

"Sugar" for Moths: Many moths (especially underwings) feed on tree sap or old fruit. You can attract them by mixing a bait, or moth "sugar," that imitates those natural food sources. Try this formula: Mix together 1 overripe banana (mashed), 2 ounces of apple cider vinegar and ½ pound brown sugar. Paint a page-size patch of the goo on trees, rocks or fence posts before sundown, then return at night to check out the visitors. Use a flashlight covered with blue plastic to watch them.



It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

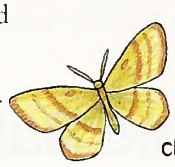
Wildlife as Seen on Coins and Stamps: Students will describe coins and stamps as examples of ways that people have used symbols to represent values of wildlife.

Rare Bird Eggs for Sale: Students will identify reasons for and consequences of collecting wildlife and wildlife products.

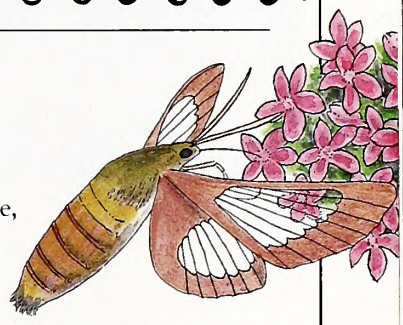
All the moths shown on these pages are life-size.

Get WILD

Advanced WILD Workshops:
Oct. 19-20 – *Water Quality*, Fayetteville, (910) 484-8479, Ext. 3.



chickweed geometer



The hummingbird moth hovers as it sips nectar from flowers during the day, just like a real hummingbird.

Editing and design by Consie Powell

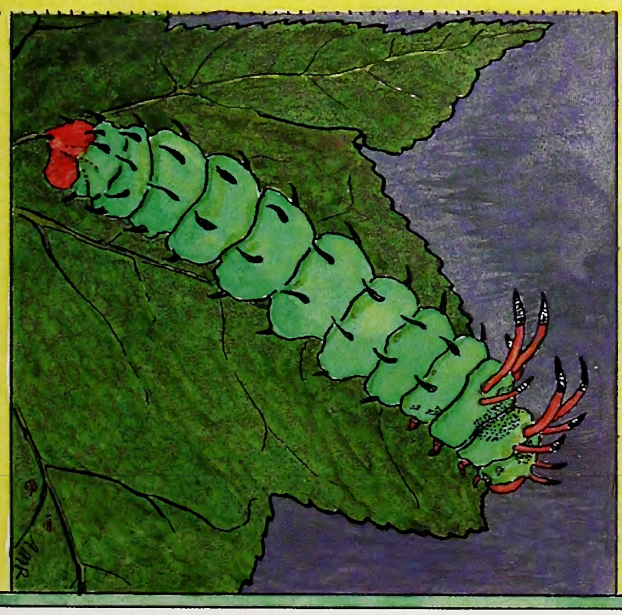
Pop-up moth card. Cut along all the thick, green lines.
Fold whole card in half. **Fold card shut.**
Finally fold the moth up like a tent inside the card.

The Regal Moth

Citherona regalis

(4 3/4" to 5 7/8" wingspan)

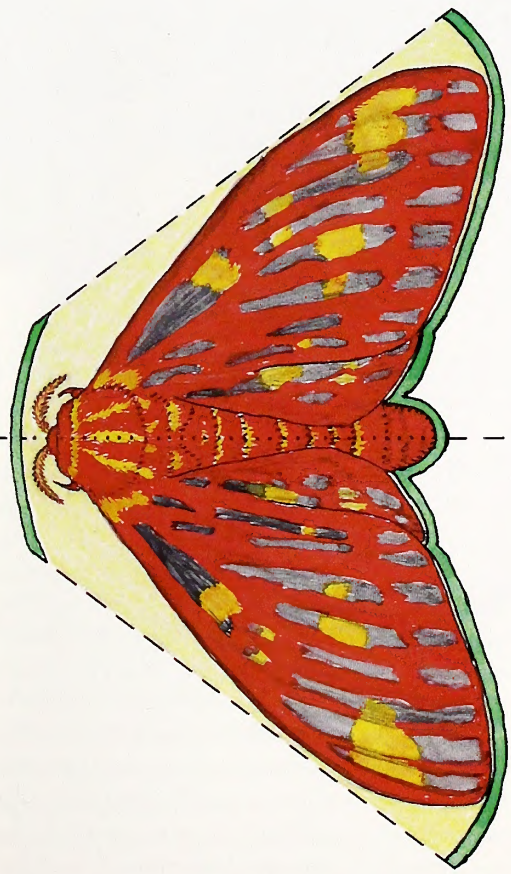
This large moth is common in North Carolina's deciduous forests. Although fierce-looking, the caterpillar will not harm humans.



sweetgum, persimmon and hickory leaves

The horned devil caterpillar munches on

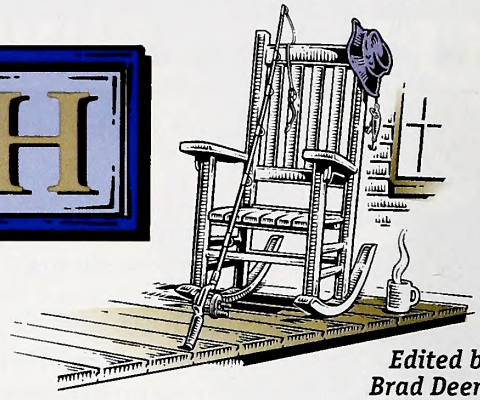
In the fall, it burrows underground to pupate . . . .



emerging in mid-summer as a big, furry regal moth.

BACK PORCH

News and Wildlife Notes



Edited by Brad Deen

Keep Wildlife—and Rabies—at a Distance

Normally shy and wary, foxes seized attention this summer through a series of rabid attacks on humans.

Three of the five bites in June and July occurred in Wake County—a teen golfer in Wake Forest, a 5-year-old playing in a Fuquay-Varina church parking lot and a woman unloading her car in Holly Springs. An Orange County man was bitten in his backyard twice in two days. And another preschooler, a 3-year-old riding his tricycle in the driveway, was attacked in Wilson.

"The fox just had him by the foot and wouldn't let go," the boy's mother told *The Wilson Daily Times*.

As of June 30 this year, according to the state Office of Veterinary Public Health, 23 counties reported rabid foxes—from Craven in the east to Rutherford in the foothills, and Stokes on the Virginia line to New Hanover on the coast.

North Carolina's rabies epidemic isn't confined to foxes, of course. Raccoons typically account for about 70 percent of confirmed cases—316 of 460 total in 2000, the state vet's office reported. Skunks came next with 59 last year, followed by foxes and bats at 35 and 33.

Wildlife accounts for 93 percent of rabies cases in the United States, according to the federal Centers for Disease Control and Prevention. Forty years ago, at the dawn of the inoculation crusade, the majority of rabies cases was among domesticated animals.

The upswing in wild rabies can put pets and humans at greater risk. Those odds rise through the rapid encroachment of suburbs into farms, fields and woods.

"When you have more people, you have more chance of exposure," said Dr. Stephanie Kordick, a state veterinarian. "When you're expanding into wild habitats, you're just encouraging it. You have more wildlife than you have space for."

—Brad Deen

N.C. WILDLIFE RESOURCES COMMISSION

How to Outfox Rabies

Each year, 40,000 people are exposed to rabies, according to the Centers for Disease Control and Prevention. One or two will die because they were unaware they had been exposed to the rabies virus or did not seek medical attention.

Minimizing your risk amounts to minimizing your exposure:

- Don't approach wild animals. If a wild animal approaches you—either aggressively or seemingly tame—suspect the worst.
- Snarling, biting and foaming at the mouth are the classic signs. But not all rabid animals follow the "furious" pattern. The "dumb" or paralytic type is more common—causing stupor, staggering or timidity. An infected pet might reject food and have locked muscles, especially the jaws.
- Have pets inoculated, and follow your veterinarian's schedule for boosters. Besides being effective, it's the law.
- Consider having pets spayed or neutered to prevent roaming.
- Remove food sources that attract wild animals, such as garbage and uneaten pet food.
- If you suspect contact with a rabid animal, call local animal control. Call the veterinarian if your pet was exposed.
- In case of human exposure, don't fear the treatment. The shots are less painful now, are given in the leg or arm instead of the stomach and are far less numerous—just six over four weeks.

For information on the Web about rabies in North Carolina, go to www.schs.state.nc.us/epi/rabies.cfm. For national and medical perspectives, go to www.cdc.gov/ncidod/dvrd/rabies/default.htm. Both sites feature pages for children.

Poaching Gets More Expensive

Kill an elk, get a bill for $2,500. The N.C. Wildlife Resources Commission in July adjusted replacement costs for elk and other wildlife killed illegally. North Carolina does not allow hunting of elk, which were reintroduced to the Smokies earlier this year.

Replacement costs cover the state's expense to purchase an animal and stock it in the wild. They are in addition to fines, court costs and other legal penalties.

Besides adding elk to its replacement cost list, the Wildlife Commission updated replacement costs for other species:

- any endangered species, $4,960
- any threatened species, $4,313
- any other species with no open season, $54
- beaver, $104
- black bear, $2,232
- crow, $4
- deer, $602
- dove, $13
- duck, $41
- fox, $88
- goose, $125
- grouse, $37
- mink, $75
- muskrat, $19
- nutria, $15
- opossum, $6
- otter, $647
- pheasant, $37
- quail, $30
- rabbit, $13
- raccoon, $58
- rail, $37
- skunk, $19
- snipe, $26
- fox squirrel, $54
- gray squirrel, $17
- red squirrel, $17
- tundra swan, $1,078
- weasel, $11
- wild boar, $755
- wildcat, $647
- wild turkey, $1,617
- woodcock, $26

The new list, which more than doubled the price for each animal, was based on changes to the federal Consumer Price Index since 1980, when state law first established replacement costs.

New Wildlife Commissioners

JODY DUGGINS

Five new appointees to the *N.C. Wildlife Resources Commission were welcomed onto the 17-member board in July by John Pechmann, far left, who was re-elected chairman. N.C. Chief Justice I. Beverly Lake Jr., second from left, administered the oath of office to (from left) W. Ray White of Manteo, representing District 1; Dalton Ruffin of Winston-Salem, District 7; Steve Windham of Winnabow, at-large; Berkley Skinner of Rocky Mount, at-large; and Douglas Parsons of Clinton, District 4.*

Protection by Design

Rare plants and plant communities won't be trampled when a new state park and game lands open.

Jocassee Gorges on the North-South Carolina line consists of 10,000 acres in Transylvania County—3,000 acres for game lands and 7,000 acres for the first state park west of Asheville.

KEVIN ADAMS

Oconee bells *are one of the rare plants found in Jocassee Gorges.*

Before building trails, roads and other facilities, however, state parks officials wanted to know where not to build them.

Plant researchers from N.C. State University and Western Carolina University spent 18 months finding and mapping rare plants, then developing a computer model that locates other likely spots where conditions are right for these same rare plants.

Several uncommon plant species are found in Jocassee Gorges because the rugged terrain and pristine waterfalls host some rare plant communities.

Rich cove forests, for example, occur in small pockets of unusually fertile soil in protected valley bottoms. Growing in Jocassee Gorges' rich cove forests are butternut trees and ginseng, both of which are on the N.C. Plant Watch List.

Spray cliffs, another rare plant community, are a type of vertical wetlands beside waterfalls. Spray cliffs support such unusual flora as the Appalachian gametophyte, a watch list fern that is found only in these rare mountain habitats and in the Tropics.

Such information and the resulting maps—based on surveys and aerial photos—will be used by park designers to plot campgrounds, picnic areas, trails, overlooks, a visitors center and an interpretive area with a museum.

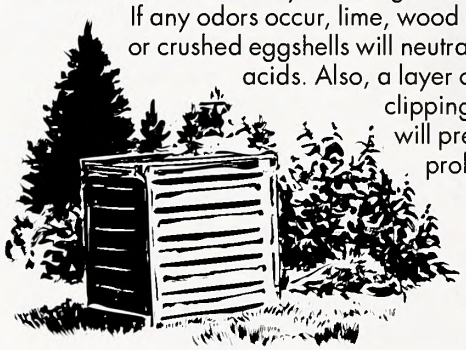
Wildlife through the *Year*

Ah yes, leaf-raking time is upon us again. But before you start piling up leaves at the curb to be taken to the landfill, consider composting them. Creating compost is an excellent way to make your own fertilizer, and you'll be glad you did come spring.

To build a compost structure, first find an area that has equal amounts of sunlight and shade. Next, remove the grass to expose the dirt where the compost will be placed and build a structure 4 feet wide by 4 feet tall. This could be something as simple as four posts surrounded by chicken wire or wooden slats. It is important to choose a design that provides air circulation to the compost.

For best results, use 2 to 6 inches of branches, leaves or straw for the bottom layer. These are high-carbon materials that provide air circulation from the bottom of the pile. The next layer should include 6 inches of high-nitrogen materials such as grass clippings or manure. That sequence should be repeated until reaching the top. For faster decomposition, the pile should be turned every couple of weeks and kept damp, not soggy. Also, dirt can be added to provide the mix with healthy microorganisms.

If any odors occur, lime, wood ashes or crushed eggshells will neutralize the acids. Also, a layer of grass clippings on top will prevent insect problems.



—Chris Powell

Old 288 Fishing Pier Opens

Anglers in and around Swain County have a new fishing hole. The N.C. Wildlife Resources Commission recently opened the 288 Public Fishing Area off Old N.C. 288, two miles west of Bryson City.

Built beside an existing boat access, the wooden, T-shaped pier accommodates up to 15 anglers. It is located where the Tuckasegee River flows into Fontana Lake, providing year-round opportunities for bluegill, catfish and smallmouth bass and seasonal opportunities for walleye and white bass.

And it provides needed access for anglers with handicaps.

"In Swain County, and actually in this region of the mountains, we did not have a universally-accessible pier for local citizens or visitors, but we have some folks who really need access to the lake and the river for fishing," said Linda Cable, county administrator.

MALLORY MARTIN

***All anglers**—no matter their physical ability—can enjoy the fishing from the new public area near Bryson City.*

The nearby parking lot includes two designated handicapped spaces and four additional spaces. Swain County is considering an expansion with lighting, rest rooms and a campground.

The commission dedicated the 288 Public Fishing Area in honor of C. Richard Guier, former mountain region supervisor for the Division of Inland Fisheries. A plaque mounted on the pier recognizes Guier's "fisheries management and angler access improvements made during his 30-year career."

◆ ◆ ◆

To Get There

From Bryson City, take Veteran's Boulevard (Old N.C. 288) west to the four-way intersection at Bryson Walk. Turn left, and follow the signs for about two miles.

Paddle Trails Map Available

Not all trails are for walking. The North Carolina Coastal Plain Paddle Trails Guide depicts 1,200 miles of water trails in eastern North Carolina. The color map includes tips for all levels of canoeists and kayakers—beginner to expert. Trails range from brackish marshes on the Alligator River to the towering bald cypresses on Lake Phelps. For a longer trip, try an intermediate-level jaunt down the Cape Fear River or a more challenging paddle down the Roanoke River.

The map is available online (www.ncsu.edu/paddletrails). A hard copy is available from outfitters, or it can be ordered from the N.C. Division of Parks and Recreation, 345-B Park Entrance Road, Seven Springs, NC 28578, or phone (919) 778-9499.

Calendar of Events

Friday-Sunday, Oct. 5-7
The Mid-Atlantic Duck and Deer Exposition in Williamston will feature exhibits from manufacturers and retailers of outdoor sporting goods, as well as seminars, presentations, trials and demonstrations. The show will take place in the Sen. Bob Martin Eastern Agriculture Center. Admission is $6. For more information, log onto www.huntshows.com, or call (919) 787-8821.

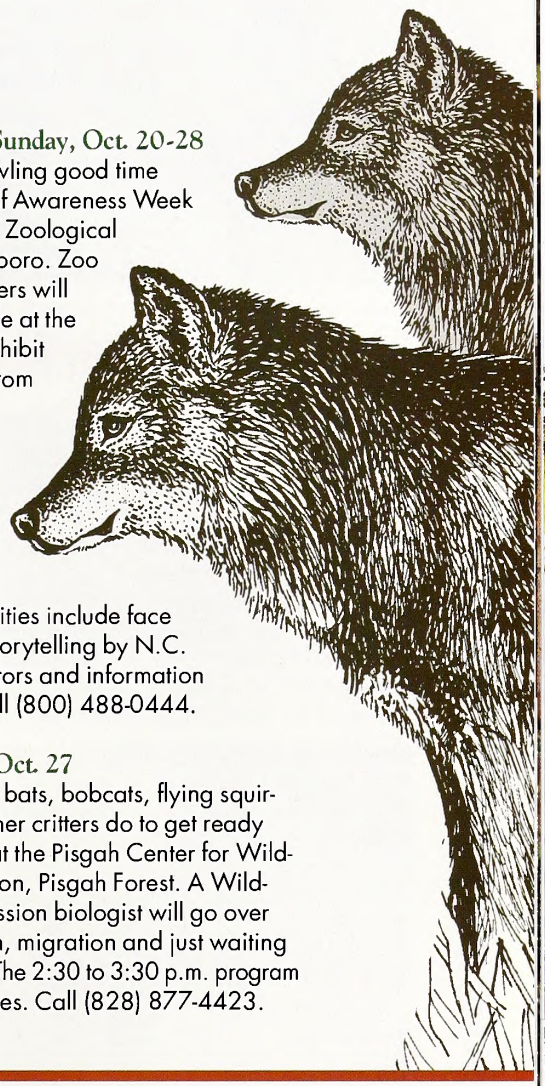
Saturday, Oct. 6
Capt. Charlie's Kids Fishing Tournament, sponsored by the Southport Parks and Recreation Dept. and the Southport Lions Club, is open to anglers 16 and under. Prizes are offered for the biggest catch of several species, as well as for most and largest overall. Held at the Southport City Pier in Brunswick County, the event lasts from 10 a.m. to 4 p.m. The first 100 participants get free T-shirts. Call (910) 457-7945 or (910) 457-7923.

Friday-Sunday, Oct. 12-14
Interested in surf fishing but lack the know-how? Learn all the angles in the 11th annual Surf Fishing Workshop sponsored by the N.C. Aquarium at Pine Knoll Shores. The $125 fee covers all instruction, Saturday breakfast and lunch and a Sunday ferry trip to Cape Lookout National Seashore. Participants who lack equipment and tackle should not buy any before attending, but borrow it if possible. Early registration is advised. Call (252) 247-4003.

Sundays, Oct. 14, 21, 28
Tired of driving the Blue Ridge Parkway to view fall colors? Want to see splendid foliage in the Piedmont? The Jamestown Fall Leaf Boat Tour offers a scenic, 45-minute pontoon boat ride around City Lake four times a day on Sundays. Call (336) 883-3498.

Saturday, Oct. 20
Explore a wetlands ecosystem while enjoying crisp mountain air, vivid colors and smells of fall at the Cradle of Forestry national historic site, Pisgah Forest. The 2.5-mile guided hike called Bogs, Bugs and Beavers starts at 10:30 a.m. Call (828) 877-3130, or go online: www.cradleofforestry.com.

Saturday-Sunday, Oct. 20-28
Have a howling good time during Wolf Awareness Week at the N.C. Zoological Park, Asheboro. Zoo staff members will be available at the red wolf exhibit each day from 11 a.m. to 2 p.m. to provide information and answer questions. Other activities include face painting, storytelling by N.C. Zoo educators and information booths. Call (800) 488-0444.



Saturday, Oct. 27
Learn what bats, bobcats, flying squirrels and other critters do to get ready for winter at the Pisgah Center for Wildlife Education, Pisgah Forest. A Wildlife Commission biologist will go over hibernation, migration and just waiting out winter. The 2:30 to 3:30 p.m. program is for all ages. Call (828) 877-4423.

MELISSA McGAW

Nature's Ways

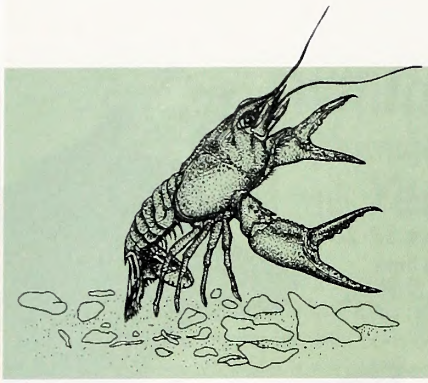
The Changing Leaves

by Jeff Beane

Why do autumn leaves change color? The answer is complex, but it involves three basic, interrelated factors—leaf pigments, photoperiod (amount of sunlight each day) and weather.

Leaves contain three major pigment groups: chlorophyll, the remarkable compound that plants use to make their own food, which appears green; carotenoids, showing as yellow or orange; and anthocyanins, which appear red or purple. Carotenoids are always present in leaves but are masked during summer by chlorophyll's green. The yellow pigments show as the chlorophyll breaks down under cooling temperatures and decreasing photoperiod. These conditions also cause leaves to retain sugar. Along with ample sunlight, this sugar increase produces anthocyanins. Some trees (hickories, birches) produce few anthocyanins, invariably turning yellow. Others (dogwoods, maples) crank them out in brilliant reds. It is anthocyanins that have the greatest overall effect on fall color intensity.

Finally, that most fickle of factors—weather—affects the timing and extent of the color change. A late spring, a severe drought, an unusually wet or warm fall or an early freeze can all delay or diminish autumn's glory. Successive warm, sunny days and cool but not freezing nights usually produce the most spectacular colors. Though autumn's color show comes every year, no two years are exactly alike.



The North Carolina Wildlife Resources Commission has begun a statewide project to investigate the status of rare crayfish using field surveys and computer mapping. North Carolina currently harbors a high diversity of crayfishes, around 40 species. Surveys will be conducted to obtain information about the range, abundance and health of each of 21 rare crayfish species found in North Carolina.

Waterfowl Seasons Set

The N.C. Wildlife Resources Commission on Aug. 29 approved the following migratory waterfowl hunting seasons for 2001-2002:

- ducks, mergansers and coots – Oct. 3-6; Nov. 3-24; and Dec. 8-Jan. 19. Exceptions are black ducks, which cannot be taken until Dec. 1; canvasbacks, which cannot be taken until Dec. 28; and harlequin ducks, for which there will be no season.
- sea ducks – Oct. 1-Jan. 19;
- Canada geese – Nov. 3-Dec. 31, except in Northeastern counties. See 2001-2002 *North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*.
- snow and blue geese – Oct. 22-31 and Nov. 16-Mar. 9;
- brant – Nov. 10-24 and Dec. 8-Jan. 19;
- swan – Oct. 22-Jan. 31, by permit only.

Bag limit for ducks is six with no more than:

- one black duck;
- four mallards with no more than two hen mallards;
- two wood ducks;
- two redheads;
- three scaup;
- four scoters;
- one fulvous tree duck;
- one mottled duck;
- one canvasback;
- one pintail.

Bag limits for other species:

- 15 snow and blue geese, no possession limit;
- two brant;
- five mergansers (one hooded merganser);
- seven sea ducks (four scoters) in special sea duck areas only;
- 15 coots;
- two Canada geese during Nov. 3-Dec. 31 season.

MELISSA McGAW

Possession limits are twice the daily bag limit unless otherwise noted. Shooting hours are one-half hour before sunrise to sunset.

Catch Us at these Numbers

1-800-662-7137 to report violations of hunting ond fishing lows

1-800-628-3773 (NC VESSEL) for boot registrotion and titling

1-800-675-0263 for hunting dotes and shooting hours for migrotory gome birds

1-888-248-6834 (2HUNTFISH) to purchose most licenses with VISA or MasterCord using o touch-tone telephone

1-800-446-8663 (I GOT ONE) to report big gome horvests

Connect to the Commission's online Web site ot **www.ncwildlife.org**

Calls are answered in order, but some numbers may require a wait during busy seasons.

Wildlife Endowment Fund Report

Fund Balance $44,027,975.00

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to Wildlife in North Carolina *magazine, as well as from tax-deductible contributions. Although the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.*

On Patrol

A videotaped beating near Belhaven brought a commercial fisherman a-"fowl" of federal game laws. The fisherman on Pungo Creek was caught in January pulling at least eight canvasback ducks from his nets, bashing their heads against the side of his boat and tossing the birds in his cooler. The witness took the tape to state wildlife Master Officer Anthony Cox, who found the fisherman from the boat registration number on the tape. The fisherman made himself easier to spot by dressing the ducks in his yard, leaving a pile of feathers. Confronted with the taped evidence, the fisherman confessed. He explained that he had been in court that same day on a marine fisheries violation and was venting his frustration. He was soon back in court, where he was found guilty on a federal charge of illegally taking ducks.

N.C. WILD STORE

NEXT

in our "Sporting Heritage" poster series...

SPORTING DOGS OF NORTH CAROLINA
Trailing and Treeing Breeds

The plaintive howls of dogs hot on the scent of game—that's music to a hunter's ear. North Carolinians have valued their trailing dogs since the first English foxhounds came to the colonies in the late 1700s. Our second sporting dogs poster depicts a dozen trailing breeds—from the pint-sized feist to the regal redbone—in beautiful color. Learn their histories from the descriptions that accompany the photographs, and find out which ones tree their quarry as well. This poster includes the Plott hound, North Carolina's state dog. Poster size: 22" x 34".

$10 ITEM CODE P21

See page 38 for our Pointing and Retrieving Breeds poster.

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Salamanders of North Carolina

Explore the hidden world of some of North Carolina's most unique creatures. This poster both educates and captivates with color photographs of the 13 salamander species in North Carolina that have lungs or gills. Habitat and life cycle notes for each species accompany the illustrations (24" x 36").

$6 ITEM CODE **P19**

▲ Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set (**P17**). Guide is also sold separately.

$2 ITEM CODE **M5**

▶ Amphibians: Frogs of North Carolina Poster Set

Set of two posters in full color: The Hylid Frogs and True Frogs & Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom (22" x 34").

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

▲ Sporting Heritage Posters

These sporting heritage posters preserve two treasured traditions. Each poster is 22" x 34".

Waterfowl Decoys of North Carolina

Descriptions of classic decoys made during the heyday of waterfowl hunting complement 19 color photographs. $10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Color photographs of 16 trout flies accompany brief histories and detailed descriptions. $10 ITEM CODE **P13**

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds. This poster features 12 breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. (22" x 34")

$10 ITEM CODE **P18**

New

Sporting Dogs Poster Set. Buy both posters and save: Pointing & Retrieving and Trailing & Treeing Breeds (featured on page 37).

$16 ITEM CODE **P22**

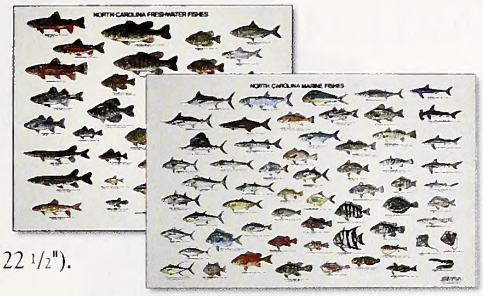
While Supplies Last

▶ Reptiles of North Carolina

Set of 4 posters in full color. Each poster describes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, live-bearing snakes and egg-laying snakes. Each poster is 22" x 34".

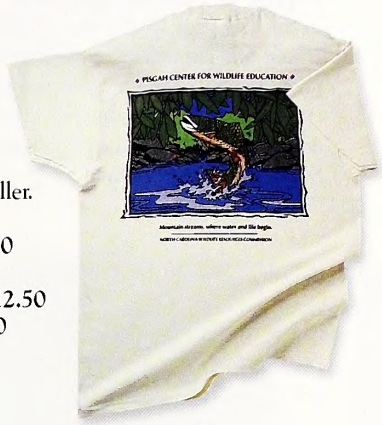
$18 ITEM CODE **P10**

Fishes of North Carolina



Reel yours in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").
$10 ITEM CODE P9

Pisgah Center for Wildlife Education T-shirts



100% cotton beige tee with colorful design on back and Pisgah logo on front. Adult sizes.
$14.50 ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

Wee Tees

Just like the adult shirt, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50

Sporting Heritage T-shirt

This all-cotton tee spotlights bass-fishing traditions with a Duane Raver painting of a largemouth at Atkinson's Mill in Johnston County. The sporting heritage logo on the front complements the distinctive scene on the back. Adult sizes only.
$14.50 ITEM CODES:
A12MED (medium)
A12LRG (large)
A12XLG (extra large)
A12XXL (extra extra large)

A11

Items not pictured:

All Things Are Connected

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.
$22 ITEM CODE W3

Wildlife Babies Video

Classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.
$20 ITEM CODE N9

North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format booklet provides information and regulations for each stream. Each map depicts game land boundaries, federal lands and state parks, as well as major roads and towns.
$12 ITEM CODE TMAP

Bird Houses and Feeders

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.
$2 ITEM CODE M6

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.
$10 ITEM CODE M2

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each
Cub & Boy Scout Correlation ITEM CODE E9
Girl Scout Correlation ITEM CODE E10

Embroidered Caps

Wildlife in North Carolina Caps

Exclusive designs and magazine logo are featured on four different cap styles.
$16.50 each

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE A11
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill and nubuck suede closure. ITEM CODE A3
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE A7
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE A6

A3

A7

A6

A1

A10

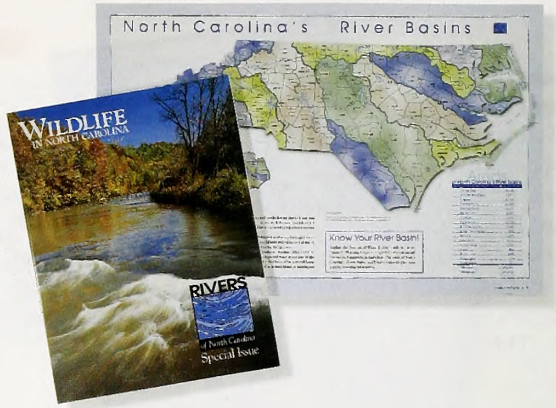
N.C. WILD Caps. N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.
$16.50 each

- Tan cap with forest green bill. ITEM CODE A1
- Tan cap with burgundy bill. ITEM CODE A10

Rivers of North Carolina ▶

In this 128-page special issue of *Wildlife in North Carolina*, the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

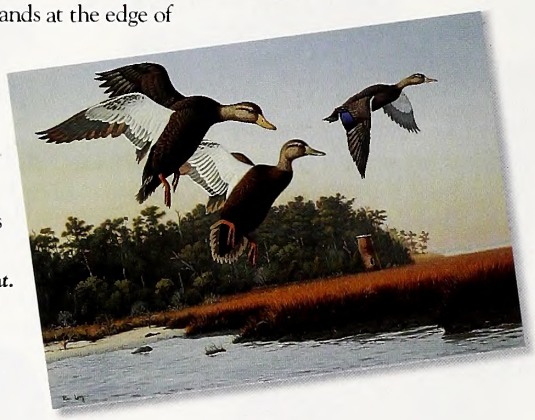


2001 Migratory Waterfowl Print and Stamp Set ▼

Black ducks take wing over an estuarine marsh on the lower Cape Fear; Price's Creek Lighthouse stands at the edge of the woods, as it has since 1849. This year's limited edition print, signed by artist Ron Louque, combines waterfowl heritage and N.C. history. Your purchase will support wetland restoration and waterfowl research. Overall size is 12" x 14"; image size 6 1/2" x 9".

This item not subject to 15% discount.

$145 ITEM CODE **DSP01**



Dogs that Point, Fish that Bite ▼

Sample 50 of Jim Dean's best essays for *Wildlife in North Carolina* magazine.

Hardbound $19.95
ITEM CODE **M8**

Paperback $10.95
ITEM CODE **M12**

The Secret Lives of Fishermen ▶

More of Jim Dean's well-honed observations on hunting, fishing and the country life.

Hardbound $24.95
ITEM CODE **M13**

North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

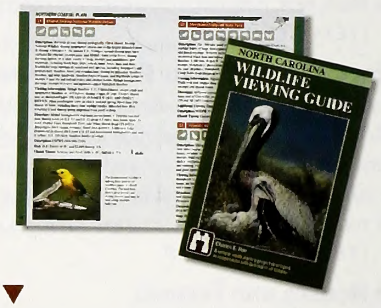
Explore the diversity of the state's natural communities. This soft-cover book describes 13 habitats across the state with illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a N.C. WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

$16 ITEM CODE **E6**

North Carolina Wildlife Viewing Guide ▼

From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**



Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

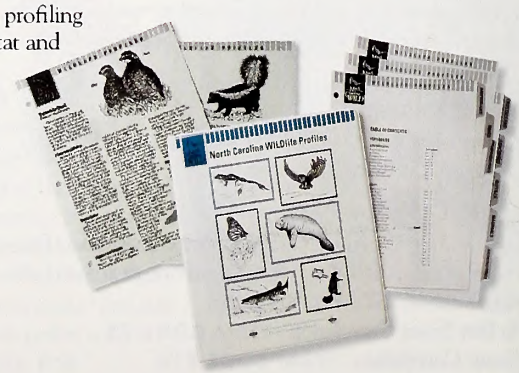
Unboxed set. $27.50 ITEM CODE **M9**

N.C. WILDLife Profiles Binder & N.C. WILDLife Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**



THE 2002 NORTH CAROLINA WILDLIFE CALENDAR IS HERE.

In a rite of spring, two male cardinals vie for the affections of a female perched on a nearby dogwood limb. "The Suitors" is just a sample of the fine art featured in the *2002 North Carolina Wildlife Calendar*. To order yours, use the convenient order form at the front of this magazine.

"The Suitors"
Tim Bruce

courtesy of Mrs. Jean McFarlane

APRIL 2002

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
To subscribe to WILDLIFE IN NORTH CAROLINA MAGAZINE call 1-888-248-6834	1 • Fish for white bass early in the month	2 Invest in the future with lifetime licenses.	3	4	5 • This month fish for largemouth bass and crappie along the shorelines	6 • Peak births for gray fox and beaver • Hatchery-supported trout waters open
7 Daylight Savings Time begins	8	9 • Fertilize farm ponds for first time	10 • Deer begin new antler growth	11 • Last freeze in the Coastal Plain	12 Help make a difference—contribute to the Nongame and Endangered Wildlife Fund.	13
14	15 • Red-tailed hawks begin to nest • Lower Roanoke striped bass season closes	16 • Catfish begin spring run in Chowan River	17 • First leaves appear in mountains • Redbud blooms peak	18 • Snakes begin to appear • White bass fishing peaks on western lakes	19 • Wild turkeys begin to nest	20 • Grouse drumming peaks
21	22 • Striper run peaks on Dan River	23 • Quail begin nesting	24 • Ospreys, hawks begin nesting • Mountain apple blossoms peak	25 • Peak turkey gobbling in Piedmont, Coastal Plain	26 • Rails begin to nest • Last freeze in the Piedmont National Arbor Day	27 • Second fertilization of farm ponds
28 • Sunfish begin spawning	29 Give lifetime subscriptions to *Wildlife in North Carolina*—for a lifetime of enjoyment.	30 • Peak turkey gobbling in Mountains • Upper Roanoke striped bass season closes	Fishing Days: Best, Good, Fair, Poor. Moon Phases: New, Last Quarter, Full, First Quarter	Report Wildlife Violations Call Toll-free 1-800-662-7137		

March

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
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31						

May

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26	27	28	29	30	31	

Fall on the Water

The russet leaves of cypress trees mark the arrival of autumn on an eastern North Carolina millpond. For more on the colors of fall, see page 18.

LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
CONOVER, NORTH CAROLINA

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WILDLIFE IN NORTH CAROLINA

NOVEMBER 2001 $1.50

Rats in the Treetops

by Jim Dean

A lot of folks don't like gray squirrels. I'm partly guessing, but most squirrel haters seem to be urban dwellers who judge bushytails solely on their innovative skills at raiding bird feeders. "You know they're just rodents, don't you?" said one of my neighbors. "Treetop rats with fuzzy tails." Well, yes, that is essentially what they are, but we're flirting with environmental racism to point it out. I like squirrels, and so does everyone I know who grew up beyond the city limits where squirrels have historically been considered game animals rather than clever adversaries.

Just as the bluegill was most likely the first fish we ever caught, the squirrel must have been our first kill. Indeed, it was the only practical quarry for a 10- to 12-year-old kid whose entry-level gun was a .22-caliber, bolt-action rifle. A single-shot .410 or 20 gauge better suited for quail or rabbits might follow a few years later. But the basic .22 was the tool most rural parents chose to teach firearm responsibility because you could learn gun safety under supervision while plinking at paper targets.

JIM DEAN

There were plenty of squirrels in the dense woods along the edge of Urahaw Swamp a few hundred yards behind my grandmother's house in Northampton County, and Dad and I hunted them regularly after Santa brought me a new Model 69-A Winchester. It was a bolt-action with a 5-shot clip, nicely blued steel and a real American walnut stock (a lot of gun for $35 even then). But it was no match for Dad's handsome Winchester Model 63, a lovely semi-automatic with a stock-fed magazine and a factory-installed Redfield peep sight. Together, we would creep along quietly, trying to avoid dry leaves on the dirt path that led through the woods to the back field on the swamp's edge. Sometimes we would get a shot, but more often we wouldn't see a squirrel in range until we sat down and waited motionless for 30 minutes or so.

"Together, we would creep along quietly, trying to avoid dry leaves on the dirt path that led through the woods to the back field on the swamp's edge."

After I'd earned some trust, I was allowed to hunt solo. It was (and is) a grand and utterly delicious adventure to be alone in the woods with your own .22, but especially at the age of 12. The first squirrel I brought home couldn't have garnered more praise if I'd dragged home a field-dressed moose. And I doubt that anything will ever taste better than that first squirrel, parboiled and lightly fried in batter. (I have since heard, by the way, that rats are equally toothsome, but I haven't gotten around to mentioning that to my neighbors.)

Over the years, my squirrel-hunting skills improved. I learned to seek bushytails along the ridges where there were lots of hickories, and especially where stumps were covered with fresh cuttings. I looked for damp, windless days when you could move more quietly and spot squirrels more easily. I used the old trick of tossing rocks into the leaves on the opposite sides of trees to get a hiding squirrel to slip around to my side. When the law added a provision allowing you to hunt squirrels with a .22 pistol, I tried that, too. For several years, my friend Mike Gaddis and I annually floated the Neuse River from N.C. 50 to N.C. 96 until the flooding of Falls Lake put an end to that. As I grew older, however, other obligations and interests intruded, and squirrel seasons began to slip past without my attendance.

But not this year. My son, Scott, and I have plans, and that's not all. He has a wonderful old Model 62 pump .22 that my Dad has given him. And since Dad's no longer hunting, I am now the caretaker of his Model 63. When I pulled it out to clean it this past summer, I found the original papers that came with it, along with some old targets Dad had shot (the bulletholes are piled atop one another in the bulls-eye). And there was also a yellowing letter on *Outdoor Life* stationery dated 1947. It was from Jack O'Connor, one of the premier gun writers of all time, responding to a question Dad had posed about the best choice of sight. "Get the Redfield," O'Connor had advised.

So this winter, Scott and I are going squirrel hunting again, accompanied at least in spirit by Mr. O'Connor and Dad. It's been too long since he and I hunted bushytails together, but I'll bet he hasn't forgotten that he shot his first squirrel on a wooded ridge overlooking the Neuse River just past the bridge on U.S. 401. Fancy houses have long since blanketed that spot, but I know where there's a hickory grove that ought to serve well.

I also wonder if any of us would be worrying so much about guns and violence these days if the simple recipe for raising a responsible child still called for a parent-teacher, a Santa rifle and a few tasty rodents.

N.C. DOCUMENTS
CLEARINGHOUSE

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STATE ... ROLINA

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife in North Carolina (ISSN 0043-549X) (USPS No. 683-980) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U.S. Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **Copyright © 2001 by the North Carolina Wildlife Resources Commission. No portion of this magazine may be reproduced by any means without the written consent of *Wildlife in North Carolina*. The N.C. Wildlife Resources Commission is an equal opportunity agency.**

A Partner for Life

Teaching your children to hunt has many rewards—not the least of which is raising a life-long hunting partner.

written by David Hart

DAVID HART

The battle started with a single acorn: To get Kyle's attention without raising my voice, I'd have to bean him in the back. The thumb-sized nut bounced off my son between his shoulder blades. Kyle turned and glared at me.

"Slow down," I said, with an insistent whisper. But the hunt, at least for a few minutes, was over. Kyle bent down and gathered a handful of acorns and started pitching them at me with all his might. Matt grabbed his own handful and joined his brother. Before I could get upset with my boys, I found myself engaged in an impromptu game of war. I unloaded my .22, laid it on the ground and forgot about the squirrels we came for. The three of us ducked behind trees, chased each other through the woods and rejoiced at each acorn that found its mark.

It was opening day of squirrel season, and the deer archery season was in full swing. But instead of leaving Kyle and Matthew at home and spending another perfect fall morning in a tree stand alone, I made the easy choice of taking a 4-year-old and a 6-year-old on a hunting trip. The deer and the solitude could wait.

This outing was nothing new for my boys. Kyle and Matt have been hunting with me since before they were able to walk. Kyle, now 7, participated in his first successful deer hunt when he was 10 months old. He rode in a backpack slung across my shoulders as I pushed a small group of deer past my wife, who sat at the base of a tree with a .243. Kyle slept through most of the hunt, and I remember putting my son down on a blanket, sticking a bottle in his mouth and changing another wet diaper. Then his mother and I finished the task of field dressing.

> **"I want to know that with a phone call to either child, I can have a friend to hunt with, even after they've become grown men."**

Since those first outings, my boys have participated in dozens of successful deer, squirrel, dove and goose hunts, and we've had a few close calls with spring gobblers. Some hunts were interrupted by acorn fights or rock-skipping contests, but the smiles always overshadowed the empty game bag. It's a fair trade.

A friend boasts that my children know more about wildlife and hunting than many seasoned hunters. I wouldn't go that far, but if I can help it, it won't be long before his claim holds at least some truth.

Over the course of my children's short, outdoor-filled lives, I've learned how to keep them excited about the next adventure. And remember, that's exactly what each day in

WILLIAM S. LEA

the woods or on the water should be—an adventure. To a hardcore 40-year-old hunter, an afternoon of chasing squirrels may not seem like an exciting way to spend a Saturday, but to a child any hunting trip is a thrilling one.

Without a doubt, the most important aspect of any outing is to keep it fun—for the kids. Sure, you may want to sit rock-still until you've plucked a limit of squirrels from the oaks or tagged that monster buck that you know is out there somewhere. But what kid can sit still for four hours? A full game bag may be the goal for you, but children just want to have a good time, even if it means pitching acorns at their old man.

I'm teaching my children to hunt not because I'm afraid of what the future holds for wildlife and wild places without a new generation of hunters to care for them. I'm doing it purely for selfish reasons. I'm raising Kyle and Matt to be hunters for the simple reason that I want a couple of lifelong partners. I want to know that with a phone call to either child, I can have a friend to hunt with, even after they've become grown men. I want the memories of two smiling boys who will one day stand proud with their first dove, duck or grouse in their hands. The conservation, the respect and the love of the outdoors will come naturally with my children's passion for hunting.

F. EUGENE HESTER

***Taking a young son** or daughter hunting is much more than the pursuit of game. It's a chance to have fun in the wild while teaching safety and hunting ethics.*

DAVID HART

DAVID HART

F. EUGENE HESTER

***Squirrel hunting is one** of the best ways to introduce a youngster to the sport of hunting. Neither too much walking nor too much sitting is involved, and the odds of a successful hunt are high. It is important to involve your fledgling partner with the hunt, whether it's letting them blow a duck call or set the decoys.*

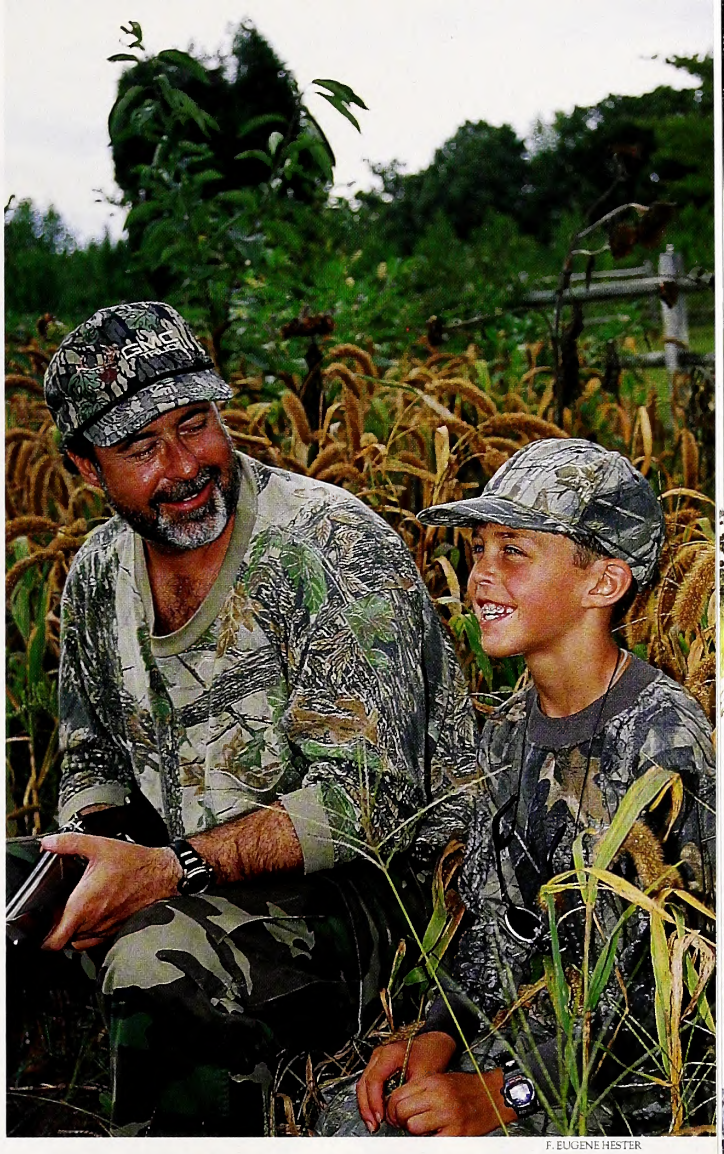
Yes, studies show that kids who hunt are less likely to become involved with crime. The bumper sticker that reads "Hunt With Your Kids, Not For Them" is an insightful one. As a father, I'm always considering such things. But mostly, I take my kids hunting because that's what I do: I hunt, and I want my children to experience a tradition that has given so much to me. What hunter doesn't?

Apparently, plenty of them. Although the number of children participating in hunting and fishing is on the rise, too many mothers and fathers would rather leave the little ones at home and use hunting for what it is—an escape from the daily pressures of life. No phones, no nagging boss, no bickering children. Nothing but silence.

But a child who never experiences the thrill of a flock of geese circling a spread of decoys or a white-tailed buck slipping through the early morning hardwoods will likely forgo a life of hunting as an adult. There are always exceptions, but statistically speaking, in order for a person to become a hunter, he or she has to start out at a pretty early age. It's true with most things. You can bet that Cal Ripken Jr. didn't pick up his first baseball when he was 18.

Is there a magic age at which children should be introduced to the outdoors? Probably not, but based on my experiences with Kyle and Matt, the earlier you can get them out, the more passionate they will become. But just as a puppy can be conditioned to fear everything associated with a bird hunt, so can a child. It's important to consider that by taking some simple steps to raising your hunting partner. ⊠

Simple Steps to Raising a Lifelong Hunting Partner



F. EUGENE HESTER

INVOLVE YOUR CHILDREN IN EVERY ASPECT of the hunt, from preparing for it the night before to cleaning game, cleaning gear and eating what you bring home. I gladly allow both boys to use my rattling antlers, grunt tube, goose call, turkey call or whatever call we need at the time. Yes, they've cost me more game than they've earned. But I coach them when appropriate and let them learn from their mistakes.

DEPENDING ON THEIR AGE, LET YOUR children carry some sort of gun, even a toy one. My kids started out with sticks and graduated to replicas of real guns. I coach them on gun safety throughout each day, scolding them when their "muzzles" point in an unsafe direction and praising them for carrying their "guns" in a safe manner. Kyle now carries a Red Ryder, and we take time to plink when the hunting is slow. In a few years, I'll buy him his first .22. Safe firearms handling should start early.

DRESS THEM WARMLY AND KEEP THEM comfortable. They can always peel off a few layers of clothes if the woods warm up, but a cold kid is an unhappy kid. Stuff an extra coat in a daypack—and let the child carry the pack. I'll sometimes carry a wool blanket and wrap my children up in it as we sit on the ground during deer season. Buy them the best pair of insulated boots you can afford.

TAKE PLENTY OF SNACKS. A CHILD WITH A belly full of chips, chocolate and Hi-C is a happy one. Don't worry about nutrition on a four-hour hunt. Just keep 'em happy. But avoid snacks with brittle, noisy wrappers. And teach them that trash belongs in a trash can, not in the woods.

LET THEM CALL THE SHOTS. IF YOUR children want to sit and wait for squirrels, great. If they want to try stalking, that's great, too. Give them control of the hunt and allow them to be part of the decision-making process, but make sure you teach them the skills necessary to be successful. I'll steer Kyle and Matt toward the right decisions, and I make them consider all the variables. Where will the deer come from, and which way is the wind blowing? Will the squirrels be feeding on acorns or soft mast?

FORGET ABOUT A FULL GAME bag. The odds are, you won't limit out while hunting with a couple of kids. Not even on squirrels or doves. Use each outing not as a chance to bring home some meat, but as an opportunity to spend quality time with your family and as a chance to instill a love of the outdoors in your children. In time, hunts will become more successful as your children learn the secrets of success.

DON'T STAY TOO LONG. TWO or three hours are usually about all young kids can handle, but the more I take Kyle and Matt, the more they want to stay in the woods a few extra hours. If you insist on making a full day of it, stop and have an acorn fight, try to catch minnows in a creek or take a trip to the nearest country store for a drink and a snack. Give them something to break the monotony of a slow day in the woods.

TEACH THEM ABOUT NATURE. EVERY outing should be a learning experience, whether it's a successful hunt or not. Take time to show your children squirrel cuttings. Look for deer tracks, buck rubs and turkey scratchings, and tell your children something about what you find. Incorporate every aspect of nature. Plants, songbirds, even geological features are all part of the intricate web of the natural world.

DON'T FORCE THEM TO GO OR TO STAY. Remember when your mom made you go shopping for school clothes every August? Maybe that's why you haven't bought a new pair of underwear in three years. If your children don't want to go, don't take them. But make certain you tell them all about the hunt when you get home. Let them know they missed a great opportunity to have fun.

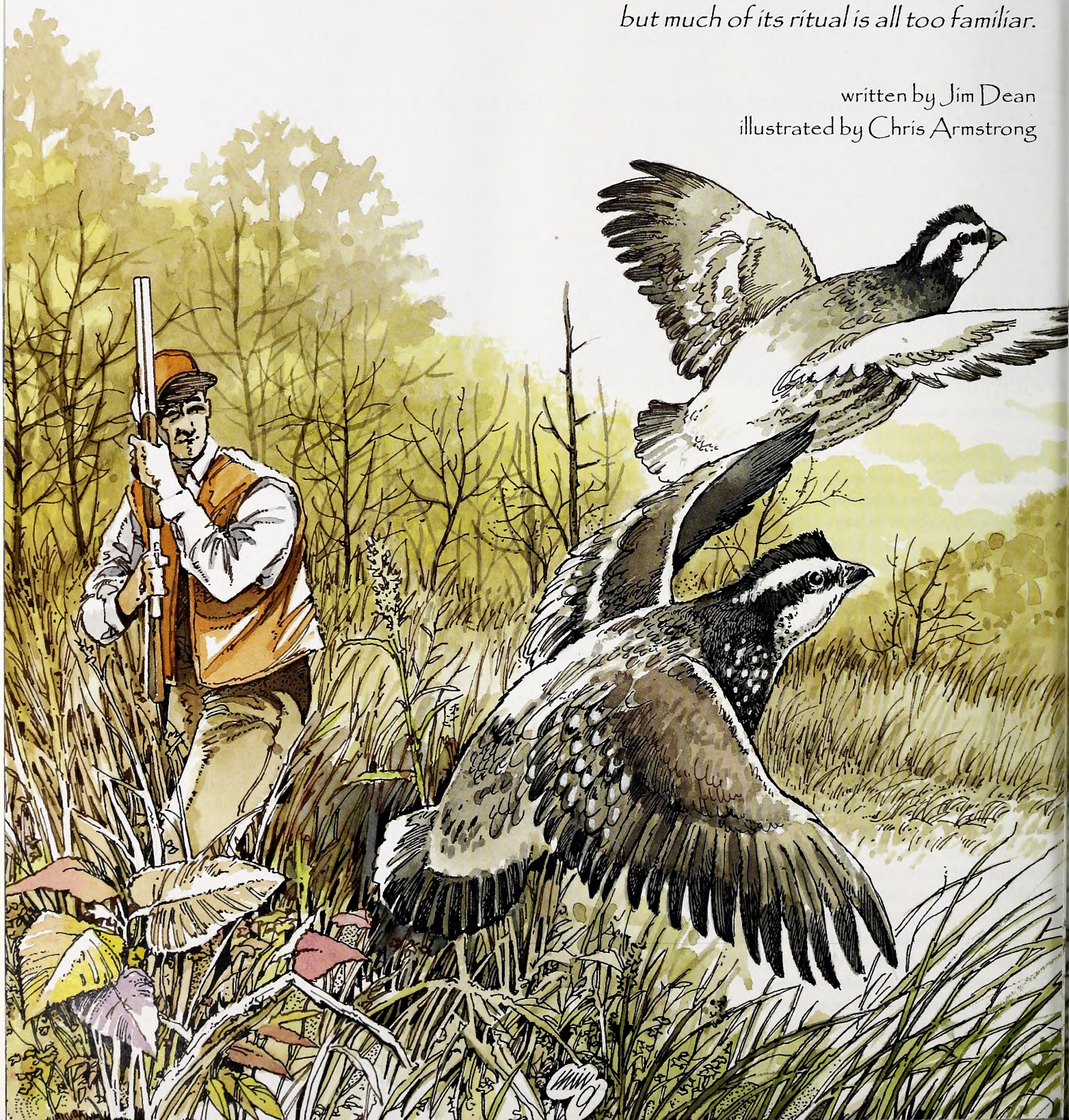
DON'T CATER TO THEM. HUNTING ISN'T easy. It requires lots of walking, much of it through thick woods, nasty briers and rough terrain. I refuse to carry my kids when they don't feel like walking. Will I help them when they need it? Sure. I'd expect the same from any friend, but there is a fine line between assisting and coddling.

TAKE THEM EVERY CHANCE YOU GET. Sometimes, hunting with children can be aggravating. They whine, they fidget, and they often ruin any chance of success. But the good outings always overshadow the bad ones. And if you don't take your kids, who will?

bobwhites

The future of quail hunting may be uncertain, but much of its ritual is all too familiar.

written by Jim Dean
illustrated by Chris Armstrong



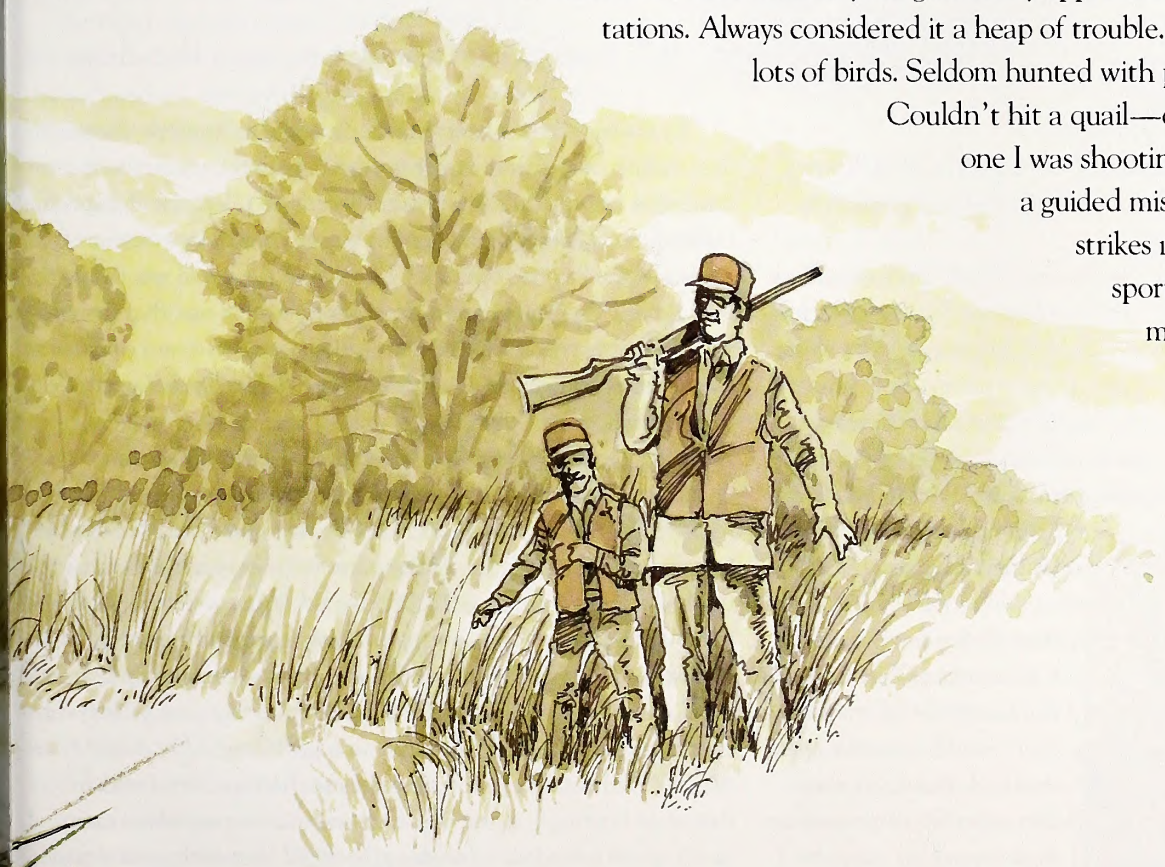
are forever

Here we are at the commencement of another quail hunting season, and I hear the same laments I've heard for years. "I don't have very high expectations," says one acquaintance. "I don't find many wild birds anymore, and I'm not sure I'm going to train another dog after this one dies. It's a heap of trouble to go bird hunting nowadays."

"There's a good reason we call it quail *hunting* instead of quail *finding*," complains another. "Besides, I don't have many places to go anymore, so I've been mostly going to shooting preserves."

"The dog finds so few wild birds, she hardly knows what to do," sighs a third. "And I get so few shots that if it weren't for skeet and trap, I probably couldn't hit anything anyway."

I nod sympathetically. I could repeat similar woes and sometimes do. But the truth is that I could have said the same thing, or worse, 30 years ago. Or 40 years ago. Indeed, I have never entered a season with anything remotely approaching high expectations. Always considered it a heap of trouble. Never found lots of birds. Seldom hunted with polished dogs. Couldn't hit a quail—or at least the one I was shooting at—with a guided missile. What strikes me about this sport is not how much it has changed, but how much it hasn't.



My grandfather and father, in company (I almost wrote "cahoots") with their dogs, unwittingly prepared me for modern quail hunting. The first hunt I distinctly remember took place at Medoc Mountain in Halifax County long before that place became a state park. I was 9 or 10 years old, and I'm sure I must have been excited to be invited on this grand adventure, even if I was too young to carry a shotgun. I recall hoping that I might get to shoot Dad's or Granddad's gun, especially since they had been acquainting me with safety rules.

I, of course, knew all about quail hunting. I had seen the calendars in the cotton sample room at Dad's office. The standard feature was always a brace of English setters—tails erect, expressions intent and handsome spotted coats perfectly coiffed—standing high and proud over a huddled covey of quail in the middle of a field of broomstraw. (There were some other calendars, I recollect, but they mostly featured someone named Vicki who apparently had no interest in dogs or quail.) I knew that those bobwhites would wait for the hunters to get perfectly ready, then fly up all together, yielding an unobstructed shot. The dogs would retrieve the downed birds and deposit them gently in hand, get their ears scratched, then go find the singles. This, I figured, would happen at least half a dozen times each trip. Certainly, one wouldn't anticipate going more than 30 minutes or so between shots. Then we would clean the birds and bring them to Grandma, who would serve them in brown gravy over rice, and nobody would break a tooth on a No. 8 lead shot.

The Medoc hunt followed this script very loosely, if at all. It was at least an introduction to the notion that not every expectation is destined to be fulfilled as imagined.

My grandfather decided to take his big setter Chief rather than Mack because Chief "needed the work." This delighted me because Chief had endeared himself to me (and possibly other family members) by lifting a leg to pee on my grandfather's boss, who was not amused. It was only later that I understood that the "work" Chief needed involved his hearing—or comprehension, particularly his ability to respond to any command, or even to react predictably to any aural stimulation except the rattle of dry food hitting a tin plate.

We loaded up, Dad and Granddad in front, me in the back seat and Chief in the trunk with the lid cracked. Every window was wide open, standard operating procedure regardless of the weather since Granddad's dogs (and Chief was no exception) were often overcome with intense gastric distress en route, or invariably contrived to roll in something long dead during the day. If you think the trunks of automobiles are sufficiently sealed from the passenger cabin to prevent the interchange of aromas, you are sadly misled.

Chief ran bloody-tail wild that day, and we ran brier-bloody wild keeping up. There were plenty of bobwhites at Medoc then—so I was informed—but if Chief ever so much as smelt one, it was not evident. No one fired a shot, although we occasionally glimpsed a distant white target that proved tempting. Except for a brief lunch break during which I sat exhausted on a log—I'd downed my coconut candy bar and soft drink before we were barely out of the driveway that morning—I spent the day slogging through thick bottoms wet to the knees, extricating myself from garlands of briers, picking cockleburs from tender spots and walking across gummy fields where the red clay built up on my boot soles until I felt as though I were walking on stilts.

Dad and Granddad both said that this was not representative of quail hunting, but I have seen little evidence to the contrary. Indeed, if you ran that Medoc hunt through a copy machine and handed me the stack, I wouldn't have to change much more than the dates to document those early years of bird hunting.

> I have few early recollections of staunch, tail-high points because most of our canine companions were practitioners of the "flying point." If a bird was in the air, so was the dog.

Our feathered objectives invariably remained frustratingly elusive, seldom making more than a cameo appearance, and covey rises were more frequently heard than seen. I have few early recollections of staunch, tail-high points because most of our canine companions were practitioners of the "flying point." If a bird was in the air, so was the dog. And though Dad and Granddad steadfastly maintained that their dogs would retrieve a dead bird (without eating it), we were such indifferent shots that we seldom had an occasion to see that skill tested in the field.

In time, I realized that it didn't matter all that much. We always managed to have a good time, and we continued to enjoy short hunts together until Granddad died at 84. On what may have been our last hunt together, I carried his old dog back to the car when it became too tired. We didn't find any birds that day, either. It would have been nice to have closed that season with one classic point and a brace of birds handsomely retrieved. But it would have been so unfittingly atypical that I might have concluded that Somebody up there has a mean sense of humor. Dad and I continued to hunt together a good bit until his last dog died, but we never encountered more than anecdotal evidence that quail hunting—in the classic sense—survives anywhere except on those old calendars. Nowadays, the dogs I hunt with, courtesy of friends like Mike Gaddis, are generally excellent. Yet most aspects of the actual hunt remain unchanged. We still plod dense bottoms and cutovers. And though the dog may get "birdy" along a field edge, the quarry is usually trailed into some impenetrable tangle. Birds still run

on the ground and land in trees, and singles from busted coveys remain as mystifyingly elusive as ever. Open-field coveys were, and still are, so rare as to be worthy of a journal entry, a $10 cigar and a bottle of vintage port. My father and grandfather would feel right at home with us.

One thing that comes with maturity, however, is an appreciation for what is familiar and comfortable, even if it is sometimes merely shared misery. Mike and I—and my son, Scott, when he can join us—walk the same routes on the same farms, wear the same brier-savaged clothes we've owned for years, and carry the same old double-barrel shotguns we inherited and have always carried. A couple of coveys sniffed out and fairly worked is more than enough pleasure to shade those trips when no birds are found. We hunt in the pages of our past.

Of course, in spite of the glacial character of my own bird hunting, I am aware that the sport and the resources that support it have been undergoing vast changes. Long before my memory of such things—perhaps in the 1930s, or later in some locales—good dogs did, indeed, point and back half-a-dozen coveys in an afternoon in picturesque fields and open edges of lespedeza. Such hunting still exists if you know where to look. But this is clearly a sport that is threatened, if not endangered.

You need only ride though North Carolina, or anywhere in quail country, to understand why. Even the unpracticed eye can see the clean fields, the steady urbanization of former wildlife habitat, the dotting of houses throughout most rural areas. There simply isn't that much prime small-game habitat left, especially from the Piedmont west. In the eastern part of the state, where some outstanding quail hunting still exists, farming practices don't leave much food or cover. Even where there still exists good habitat, those areas are increasingly shrinking islands in a sea of change.

We do what we can to improve habitat on small farms, but some biologists now estimate that it takes at least 5,000 acres of prime habitat to gain any real effects from sound small-game management. Such is the scale of the recently launched CURE program, or Cooperative Upland-habitat Restoration and Enhancement. The N.C. Wildlife Resources Commission is recruiting landowners in three focal areas across the state to participate in CURE. The intent is to enlist thousands of acres of contiguous lands whose owners have agreed to create good small-game habitat. In return, landowners get financial and technical assistance from the Wildlife Commission.

On my family's small Piedmont farm, less than 500 acres, we have incorporated 26 acres of Conservation Reserve Program (CRP) wildlife habitat, mowed strips and planted food in larger plots to keep from concentrating predators. We have preserved and created thickets and planned small clearcuts in key areas to make the land more agreeable to bobwhites. These have helped—the CRP acreage has been especially helpful in providing nesting sites—although Hurricane Fran probably did as much good as anything to restore good winter cover.

All this may have accomplished little more than maintaining a tenuous status quo. Farms around us are being developed into housing and industrial sites, and the outlook is not good. With farm profits continuing to fall, keeping our small block of habitat intact may prove intolerably impractical at some point. (If you see me driving a Porsche, you will know that quail stocks have suffered another hit.)

But it isn't likely that we will see quail hunting disappear anytime soon. Those who love the little brown birds will continue to fight a rear-guard action, with the ironic understanding that quail hunters still represent the best hope for the bobwhite's prosperity.

Meanwhile, we will find solace in the comfortable routines of the past—some that are a bit too familiar. A few winters back, Mike and I turned out his puppy, Kate, at the farm to see if she could find a few wild birds to work. We expected them, as usual, to be in the thick stuff, but she began to act "birdy" along the stubbly crown of a CRP field that had recently been mowed. Mike and I watched with casual interest, never expecting birds to be in such an exposed position. Kate pointed, moved up and pointed again. We were still not convinced, but we walked in just in case.

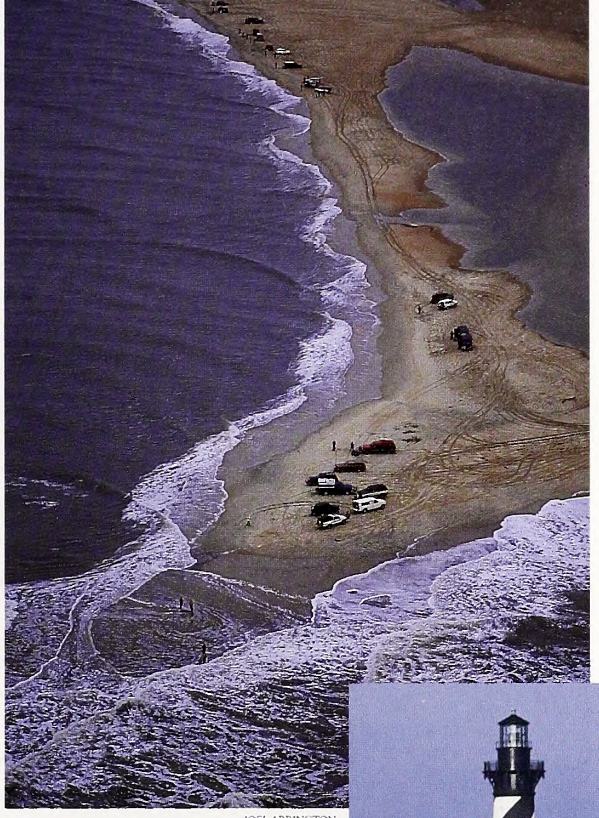
A covey of about a dozen birds blew skyward then sailed downwind in front of me, denying Mike a shot. I was so startled that I couldn't get the safety off. Mike just shook his head when I tried to explain.

Open-field covey. Calendar stuff. And we just watched them fly. Seemed like old times. ⊠

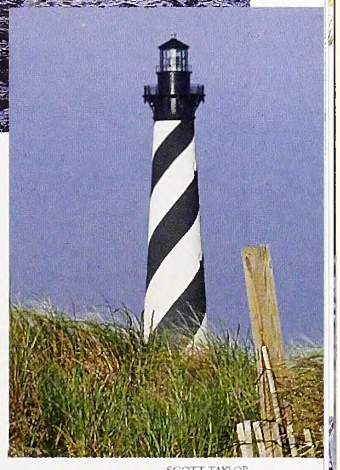
The Point

written by T. Edward Nickens

Cape Hatteras is nirvana for surf fishermen, whose pilgrimages are part of a decades-long tradition.



JOEL ARRINGTON



SCOTT TAYLOR

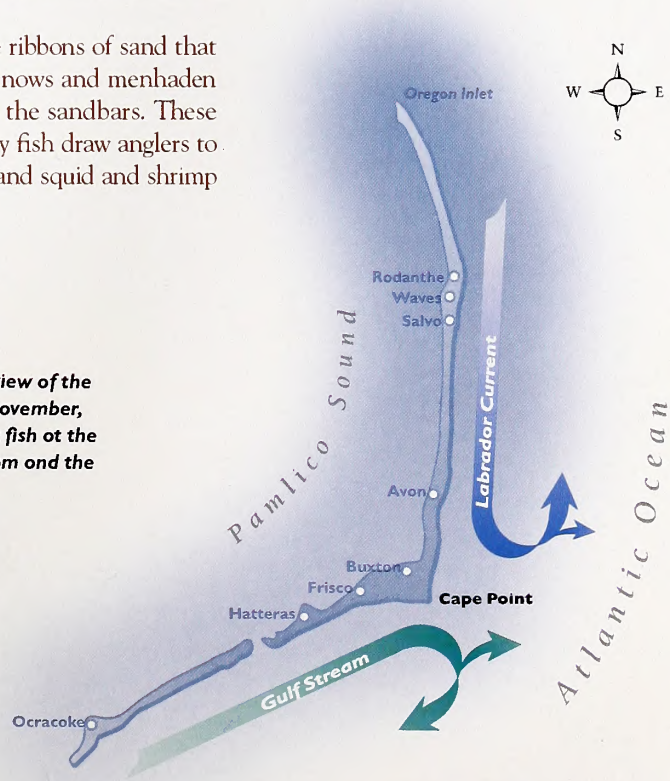
The Point at Cape Hatteras is a defiant chin of sand jutting far into the ocean. This wedge of beach succumbs to the surf but persists submerged for 20 miles in a shallows dreaded by mariners and known as Diamond Shoals. To the south, miles into the Atlantic, the Gulf Stream spins its clockwise current, pulling warm water and warmwater fishes from equatorial regions north along the Atlantic Coast. Off Cape Hatteras this river-in-an-ocean veers eastward, away from the continental verge, its impact on the weather of the Mid-Atlantic and the fish of its waters diminishing as it is absorbed into the Atlantic.

Meanwhile, another great ocean river, the Labrador Current, circulates to the north of Hatteras, a counterclockwise flow that funnels colder water and its migrating denizens from the boreal Atlantic down the continent's northeastern coast. Eddies spin off these two great oceanic currents and meet off the shore of Hatteras, bringing together water from two hemispheres and fish too: red drum and speckled trout and bluefish and striped bass.

And that is why the fishermen are here.

Nowhere else along the nation's shoreline is the culture of surf fishing so inextricably wound into the soul of a region as on the Cape Hatteras beaches—in particular at Cape Point, and in the cooling weeks of November. I have heard the stories all my life: When the great runs of red drum are in and the news is out, the trucks stack up three and five deep at the Point, the fishermen shoulder to shoulder and front to back, lines crossing in the air and water, and there is laughter and shouting and cursing and fighting and fish of impossible proportions brought to the beach.

In November along North Beach and South Beach, the ribbons of sand that embrace the Point, the currents push schools of glass minnows and menhaden against the shore, against the shoaling waters and against the sandbars. These concentrated schools of bait and the pantheon of predatory fish draw anglers to stand awash in the waves and hurl their chunks of mullet and squid and shrimp off the edge of a continent.



Surf onglers crowd Cope Point in view of the Cope Hotteras Lighthouse eoch November, drown by migratory bait ond sport fish ot the confluence of the warm Gulf Streom ond the cool Labrador Current.

"This is what I like, the sand between your toes, and you don't have to think about nothin'."

—Pat Preston

I stood on that beach on a howling November Thursday as the last gasp of a storm lashed the thin filament of Hatteras sand. I was there for the annual Cape Hatteras Anglers Club Invitational Surf Fishing Tournament. If Cape Hatteras is, as the English writer Anthony Bailey observed, "fishing mad" during autumn, then it is downright batty during the first Thursday, Friday and Saturday of each November, when 100 six-person teams line the beaches of Cape Hatteras National Seashore. They come in spanking new Suburbans and rusted-out Ford F-150s, from across the country and from the string of little villages that dot the Outer Banks.

I was there to watch, hoping to see how the finest surf anglers in the country approach their cryptic, consuming avocation. But of course I wanted to fish. I wanted to learn how to cast a piece of cut mullet far beyond the breakers and to know the difference between a red drum merely mouthing my bait and a flounder sucking it down. I wanted to know when it was best to use shrimp or squid, or if bloodworms or strips of bluefish were the wiser choice.

I figured I might as well learn from the best.

Thinking about nothing

"I've got a boat in the water that just sits there," Pat Preston told me, standing barefoot on dry sand just out of reach of each successive wave's wash on South Beach, a few hundred yards from the Point. Preston is slender and bearded, and the nails of his hands were bloody from cutting mullet into strips for bait.

"This is what I like," he said, "the sand between your toes, and you don't have to think about nothin'."

To those who do not fish from the sand—the sunbather, the shell seeker, the walker of dogs and children—surf fishing seems an inscrutable amusement. All that water and a few little-bitty hooks, standing for hour upon hour, rod in hand, belly out, feet sunk like old stumps in the sand. And the infrastructure of it all: pickup trucks bristling with rods the length of jousting lances and sagging with coolers and bait buckets and unshaven men. It seems an elaborate ruse designed to keep a person out of the house and away from useful activity, a fine excuse to drink beer, perhaps, or proof that a few folks have entirely too much time on their hands.

But I have fished enough elsewhere to know that what happens out there on the beach involves a kind of alchemy, a conspiracy of science, skill, long experience and luck that is largely invisible to the untutored. Preston might boast that he is thinking about nothing, but that is

SCOTT TAYLOR

Crisscrossing tire tracks *on the sandy beaches of Cape Point are nearly a sure sign the fish are running.*

because he has already thought about everything. The best surf fishermen seek to cleanse from the business at hand each mote of chance, each speck of happenstance. How else can you explain gear of such quantity as to require a half-ton pickup truck to transport it all? But all the while, they fervently hope that luck will not altogether abandon them. In the end, it is often the final arbiter between fisherman and fish.

Preston is 44 years old, lives in Nags Head and has been fishing for as long as he can remember. He and five cronies are the Rising Tide, a team that has traveled the surf-fishing-tournament circle for two decades. Each year they fish the four big North Carolina events: the Ocracoke Invitational in May, the "Little Hatteras" or Hatteras Village Civic Association Tournament in September, the Nags Head Surf Fishing Tournament in October and this, the "Big Hatteras" in November.

Preston held a 10½-foot rod, mated to a Penn 8500 SS spinning reel holding 900 feet of line. He reeled in his bait to show me how he was fishing. The line was tied to what is called a bottom rig, a 2-foot length of monofilament with a large lead sinker attached to its terminus. Two 6-inch-long monofilament lines sprouted from this main stem like branches on a tree. To each of those was attached a yellow foam sphere to serve as a visual attractant and a stainless steel hook baited with a chunk of mullet the size of a peach pit.

These bottom rigs come in various combinations of line materials and lengths, with or without attractor floats, and they are the surf fisherman's basic artillery. Depending on how bottom rigs are outfitted, they can be used to catch red drum, flounder, striped bass, croaker, sea mullet, sand sharks, bluefish—just about any fish that swims the surf.

Preston skewered fresh chunks of mullet on his twinned hooks, walked swiftly to the water's edge and launched the rig over the breakers. I watched the spiraling mass of lead, hook and bait cartwheel into the sky and lost it in the white glare above the horizon. I watched the water where I thought it would land. The popcorn-like splash was 40 feet farther out than I expected.

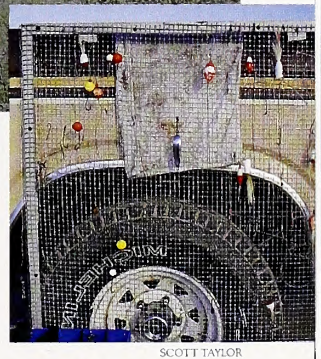
For a long time I watched Preston fish, holding his rod with one hand, index finger curled around the gossamer line to feel the nudge or jolt of a take. He stared over the water as if by sheer force of will he could compel some fish toward his line. It seemed a featureless stretch of beach—no sandy points jutting into the water to offer refuge from the current, no sandbars to funnel bait and hungry fish into a concentration and none of what fishermen call "structure" to attract and hold fish. All I saw was the incessant roll and pitch of surf.

But Donnie Ross was catching a few, so I wandered down the beach to where he leaned against a Ford pickup truck flecked with rust, its bed a wild jumble of tackle boxes, waders, miscellaneous pails and boxes, and a wide cutting board covered with a skim of blood and fish slime. Ross wore battered khakis with the legs rolled up, and his bearded face peered from under a gray sweatshirt hood. I watched carefully where his spiraling rig of hooks, bait and sinker entered the water with a noisy splash, and I began to see the structure he was fishing.

It was like letting my eyes adjust to darkness—lines and patterns slowly evolved into detail. Just beyond the breakers, some 30 feet from shore, the brown water of the churning surf gave way to a broad swath of just-so-slightly clearer water, a riverine seam with a greenish cast that flowed another 30 feet wide before changing over again to turbid seas. Ross cast to the back edge of that green seam, he told me, on the theory that larger predatory fish would be cruising the transition zone to ambush baitfish washing out of the darker water or holding in the clear.

His gambit was paying off. He caught bluefish after bluefish, some large enough to keep and therefore score in the tournament. In a few moments, most of the team members were shoulder to shoulder with Ross and each other, but only a few small fish were obliging. The fishermen changed the color of the bright wood attractors and floats—called "doodlebugs"—that festooned their bottom rigs, switching from red to white to chartreuse and back again. They tried lighter rods. They switched sinkers and hooks, baits and floats. It might be Hatteras and it might be November, but the fishing was slow and Rising Tide fidgety.

JOEL ARRINGTON



SCOTT TAYLOR

The rigs, sinkers *and lures of Hatteras surf fishing can be mystifying, but the results speak for themselves.*

JOEL ARRINGTON

SCOTT TAYLOR

***The Hatteras surf** in November can roar (above) or lap docilely against the shore (facing page). Fresh mullet is a preferred bait, but chunks of menhaden and shrimp will also do.*

Beneath the surface

The esoterica of surf fishing has always been baffling, mystical in its intricacy. The long rods and gleaming gold reels I can hold in my hands and comprehend the array of gears and spools and handles. But all of the wire leaders and oddly shaped hooks and brightly colored balls and bobs, and how to choose which and when—theirs is work unseen, out there under the swell and crash and foam, a language alien to me.

Consider sinkers, the lead weights that at first blush appear the most basic of the surf fisherman's armament. When Bob Shook pulled in two young red drum—called "puppy drum" —on back-to-back casts, I walked over to see what he was doing that others weren't. Right away I noticed that his sinker, a round coin of lead, was shaped unlike any I'd seen before. The quiet man's eyes twinkled for a moment, in instant comprehension of the depth of my query. "You could write a book on sinkers," Shook said.

A round weight such as his allows the bait to roll along the surf bottom, fluttering like a live fish. And a round sinker is easier to snatch off the bottom for a quicker hook set, critical to soft-biting fish.

Shook dug through a camouflaged bag overflowing with lead sinkers. In addition to the coin and pyramid sinkers, he said, there are storm sinkers, egg sinkers, bank sinkers and bombers, also called satellites, breakaways or Sputniks. He pulled out a wedge of lead with a concave, broad head. Locals call it a frog's tongue, or arrowhead, he said, and it's particularly suited for Hatteras waters. Strong side currents push the sinker over, driving the blunt head into the sand for a strong hold.

"But there's a lot of fishermen who don't know about all that stuff," Shook said, his cigarette pinched in a grin, "and they fish right beside you and catch the big one."

Taking into account the thousands of dollars of gear owned by the team, what role does luck play in the angler's game?

Preston thought for a quiet moment, eyes fixed on the dime-sized spot of the Atlantic Ocean where his thin line disappeared in the surf.

"I guess it's like my friend Ted Mosely says," he replied. "You can't worry about the mule going blind; you just keep loading the wagon. All we can do is fish and hope."

Showboys and po' boys

I left Rising Tide on South Beach and far behind the tournament leaders to call on a Hatteras surf-fishing legend. Zander Brody is 43 years old, with wrists freckled by the sun and a small blue tattoo on his right ring finger. When those hands are wrapped around a 13 ½-foot-long surf rod, Brody can heave 5 ½ ounces of lead more than 600 feet. That is twice the length of a football field, and while it is length enough to win Brody title as North Carolina distance-casting champion six years in a row, it is still a bit shy of the best in the world—the English casters who can lob their metal an astonishing 800 feet and more.

When Brody talks, his bottom row of teeth flash in a way that brings to mind a bulldog, which is not surprising, for his are brash, scurrilous opinions delivered with a grin. "Oh yeah," he explained, "you can fish where other people can't. One time a guy asked me, 'Man, just how far *are* you fishing out?' And I said, 'In a different ocean than you, bub.' "

On this day, Brody wasn't fishing in any ocean. The flu had kept him out of the tournament, but he wasn't so stricken that he couldn't steer his weathered Jeep Wagoneer down the beach to Cape Point. I sat in a passenger seat awash with the detritus of the avid surf fisherman: a can of bug spray, wool socks, binoculars, flashlight, drink cups, fishing lures both loose and still in their plastic wrap, a bottle of Windex to clear salt spray from the windshield, an ashtray overflowing with cigarette butts, a spool of 40-pound-test monofilament fishing line the size of a roll of toilet paper, candy wrappers, coffee filters, hooks, a sizable haul of sand and five pairs of sunglasses in various states of disrepair.

According to Brody, the Hatteras beaches used to be the tramping ground for surf-fishing addicts and eccentrics. "The people that came here, they came to fish," he said, stopping to eye a slough in the surf where terns wheeled above a school of baitfish. "Now it's trendy. Now you can take your Suburban, your mixed drinks. You've got radios blaring, car doors slamming. You've got your gadget showboys with all the toys. I don't know how much it is about catching fish anymore."

SCOTT TAYLOR

Used to be, he said, you paid your dues through accumulated knowledge. Now, you simply pay your dues.

Brody nodded toward a gleaming new Suburban some distance up the beach. "There's a showboy," he said with a disgusted spit. "Fifty thousand dollars worth of gear—and he'll wait till some broken-down [guy] like me catches a fish, and then he'll get in my waders."

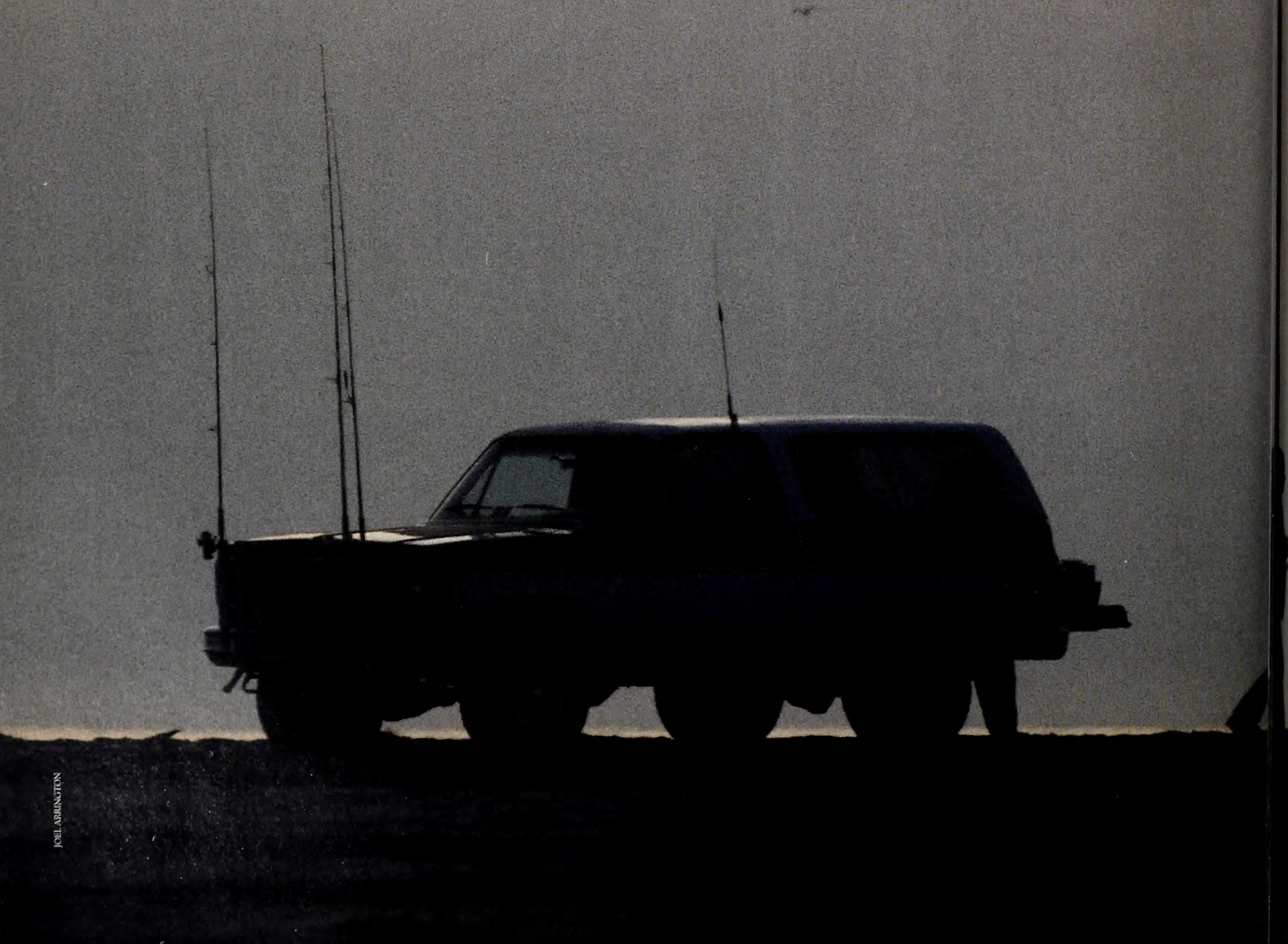
But as we slowly drove the beaches, I saw plenty of fishermen leaning against ragged old trucks, delivery vans crammed full of sleeping bunks and four-wheel-drive vehicles emblazoned with the names and telephone numbers of plumbers and carpenters and glass cutters. If anything, its plebian appeal, predicated on access to anyone with a pickup truck, is surf fishing's saving grace. The act of casting meat or metal into the ocean has yet to be cannibalized by commercialism.

"It's the only thing left where there's no money, you know?" Brody explained. The surf fishing tournaments offer prizes such as gear and tackle, but not the $50,000 jackpots of other tournaments. "Mackerel fishing, marlin fishing—it's all about the money now. Surf fishing's not like that. At least not yet."

Getting feet wet

I can watch other people fish for only so long, and I had been watching Rising Tide and hundreds of others fish for a day and a half. So on Friday afternoon, I walked into a Buxton tackle shop and, after a show of knowing what I was doing, paid $225 for a 9-foot Penn Spinfisher Big Game Surf rod and Penn 5500 SS reel, loaded with 225 yards of 15-pound-test monofilament line. My friend Scott Taylor had loaned me bottom rigs, hooks and two fresh mullet in a small cooler for cut bait. At the last minute, I bought a frog's-tongue sinker.

The drive to Cape Point resembled nothing like the trek I'd read about. My tires were in contact with hardtop until I pulled off the road onto the beach ramp near the Cape Hatteras Lighthouse, and it was but a 10-minute grind through soft sand to the Point.



JOEL ARRINGTON

Again I was struck by how closely its name reflects this lanceolate sliver of sand, impossibly frail and ever-changing. Its tip could literally be straddled, and 200 feet back the sand was just 120 feet wide, serrated by the rhythmic reach and retreat of frothy waves. A phalanx of trucks lined both sides of the spit, parked door handle to door handle, close as the teeth of a comb. For a moment, I gave grudging consideration to the thought of joining in, but I was intimidated by the scores of fisherman crowded at the Point, by the realization that my tentative cast would brand me immediately as a beginner or, worse yet, that I might use a 4-ounce pyramid sinker when these waters clearly called—to those who could hear—for a 2-ounce frog's tongue or 6-ounce Sputnik.

So I drove a couple hundred feet north of the Point and backed into a space beside a Dodge Ram truck flying the battle flag of the Confederacy. I assembled a two-hook bluefish rig outfitted with a blaze-orange and lemon-yellow attractor bead and snapped to it a 4-ounce frog's-tongue sinker. From the mullet I cut two strips of flesh and pushed the hooks through, smearing scales on my fingers. Then I flipped the reel's wire spool bail into casting position and held the loose line against the rod with my index finger.

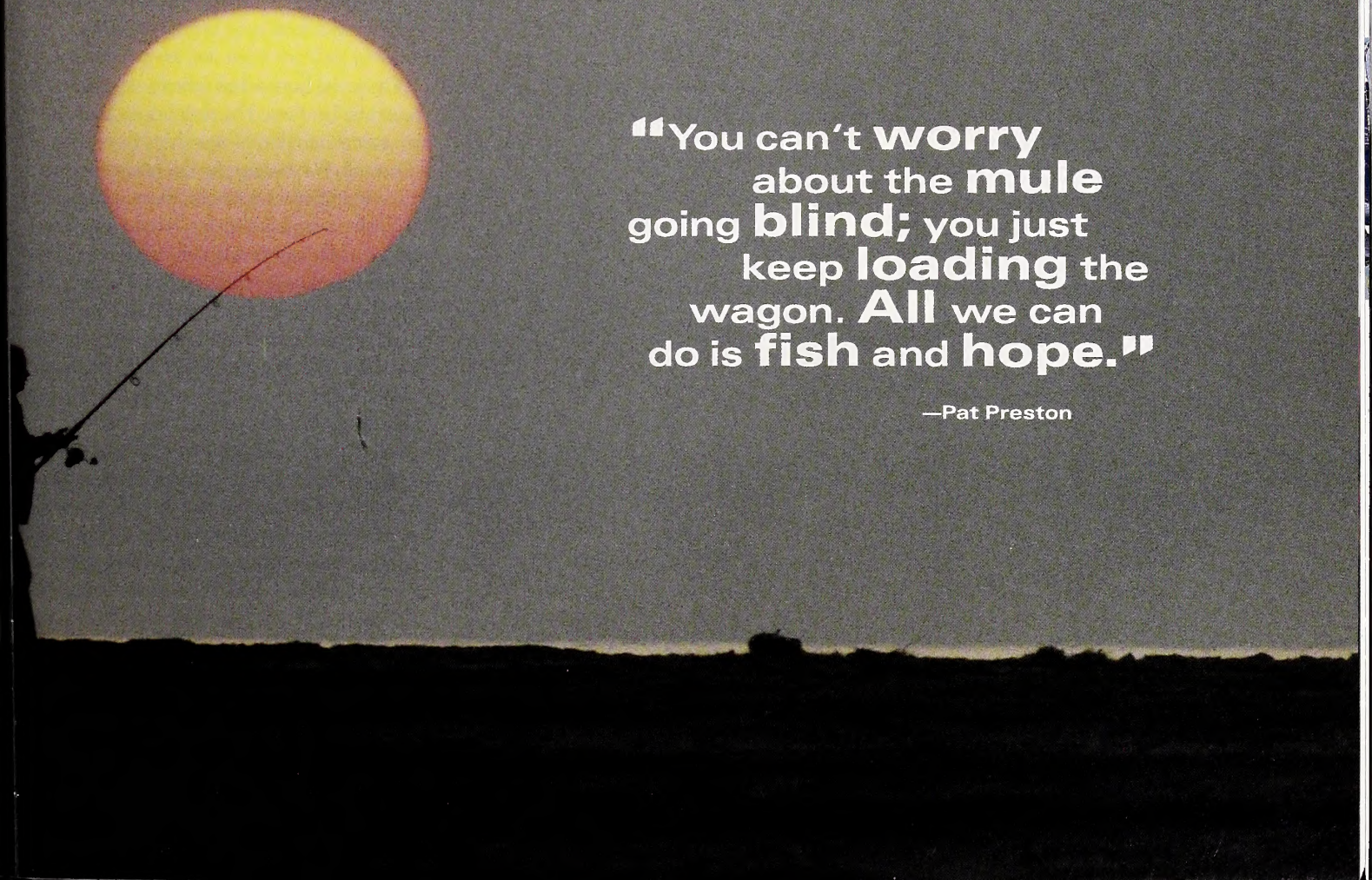
The flush of water from the first wave was colder than I'd hoped. I dropped the rod tip back over my right shoulder, let the lead sinker touch the beach and snapped forward from the waist, pushing the rod tip overhead as the line sailed over the water, pulled along by the cartwheeling mass of lead and dead fish and sharp hook. It disappeared beyond the breakers with a satisfying splash, 20 feet farther out than I expected. I reeled in the slack until I felt the tug of taut line against the fleshy tip of my finger.

For the moment I was heedless of the mule's failing vision. At least in one regard I was indistinguishable from all the other denizens of the beach. I would fish and hope. ⊠

Editor's note: *A version of this story was first published in* Coastwatch *magazine.*

JOEL ARRINGTON

Despite some waning, *the Hatteras surf-fishing culture perseveres—partly because little else can match the exultant joy of hauling a prize like the bluefish, above, onto the sand.*



"You can't worry about the mule going blind; you just keep loading the wagon. All we can do is fish and hope."

—Pat Preston

Virtues of Venison

written by Jim Casada

Properly prepared, venison provides a healthy, delicious source of protein for the dinner table.

WILLIAM S. LEA

Long before the first Europeans set foot on Carolina soil, deer were an important part of the human diet. Prehistoric man hunted, and hunted hard, with sustenance, not sport, his motivation. Though "fair chase" was a concept alien to them, prehistoric deer hunters were, in other ways, the most ethical of all hunters. They used every animal they killed to the fullest possible extent. What could be eaten was consumed. Skins provided shelter and clothing; sinews became bowstrings or thread. Antlers and bones were transformed into tools. Nothing was wasted, and that is something of which precious few of today's hunters can boast.

One constant remains, though. There is an ample measure of pleasure, a true sense of accomplishment, in the successful quest. For the sensitive and sensible hunter, the decisive moment—a genuine moment of truth—is a bittersweet one. As hunters pause to contemplate their kill, they should ponder what the finality of this act means. Theodore Roosevelt, our greatest sporting president, captured the moment well in his timeless work *The Wilderness Hunter*:

> *In hunting, the finding and killing of the game is after all but a part of the whole. The free, self-reliant, adventurous life, with its rugged and stalwart democracy; the wild surroundings, the grand beauty of the scenery, the chance to study the ways and habits of the woodland creatures—all these unite to give to the career of the wilderness hunter its peculiar charm. The chase is among the best of all national pastimes; it cultivates that vigorous manliness for the lack of which in a nation, as in an individual, the possession of no other qualities can possibly atone.*

One could only wish that Roosevelt had penned a few words to stress the importance and enjoyment of consuming one's kill, although the historical record should note that he considered those times spent around a campfire enjoying a fine meal of venison among the most memorable moments of an extraordinarily full life.

Once the hunter has taken a deer, he should be heartened by realizations that go beyond recognition of the issues Roosevelt addressed. For starters, he has made a minor yet meaningful contribution to management. For without a predator, deer would proliferate beyond all reasonable bounds. In addition, it is heartening to know that, with a clean kill, he has taken an appreciable quantity of as fine a meat as one could want. Unlike many of our beef cattle, deer are not subjected to steroids and fed foodstuffs of questionable origin.

Instead, deer have a red meat that is healthy, wholesome, low in cholesterol and fat and of considerable nutritional value. In short, the legal taking of any deer is in many senses a cause for celebration, and the recipes that accompany this piece are culinary signposts encouraging readers to share in that celebration. That is best done with venison that has been properly handled from the moment of the kill onward. So before dealing with dining on deer, let's look first at the vital matters of dressing, hanging, aging and processing your animal.

PROCESSING POINTERS

Proper handling of venison is largely a matter of using common sense, with care beginning the moment your deer is dead. The sooner you can remove the entrails and get the body cavity open for cooling, the better. Field dressing is the best way to go, particularly in warm weather. If you prefer to leave such work to a butcher or someone at your local processing operation, so be it, but delay definitely affects meat quality.

The next step is to get the gutted deer into a meat locker or cooler. Ideally, it is better to leave the hide on during the aging process, although few commercial operations will do this. The skin helps retain moisture and prevents the problem of exposed surface areas drying and hardening. Ideal aging time varies, at least in part according to the size of the deer, but most commercial processors follow a deer-in, deer-out policy. If possible, though, get your meat aged for at least a week, and 10 to 14 days is even better. The best hanging temperature is within a degree or two of 38 degrees Fahrenheit. Sometimes you can get some extra hanging time by paying a bit more, and if you do so, you will reap rewards with tastier, more tender cuts of meat.

Speaking of cuts, that's another key decision you need to make in the preparation and processing of your deer. Basically, the choice of how you want the deer worked up is one of personal preference. Some want everything but the choice cuts—back strap, hams and tenderloins—prepared as stew meat or ground up. Others, and I belong to their ranks, prefer the wider variety offered by a good mixture of roasts, steaks, cubed steaks, ground meat, stew meat, ribs, and organ meats. Incidentally, organ meats (the heart, liver and kidneys) do not need to be aged. Certainly, greater diversity of cuts lends itself to added variety when it comes to preparation for the table.

The final step in the precooking operation is a simple one, but doing it improperly can ruin perfectly good meat. Whether you perform the task yourself or have it done professionally, the wrapping must be done right. Immediately prior to wrapping, all excess surface moisture and blood should be blotted away with paper towels or clean cloth towels. This helps avoid freezer burn. Then use heavy-duty butcher paper or freezer paper for wrapping, making sure that individual packages are the size you want. Double wrapping is highly recommended.

The sheer size of a deer almost certainly means you will need to freeze an appreciable portion of the meat, unless you opt to make it into jerky or sausage. Once the butchering and wrapping have been completed, freeze the meat at once. Many commercial processors can "quick freeze" meat, and if this is possible, it is advisable. Properly handled and prepared venison should keep in your home freezer for a year without any appreciable deterioration in quality.

VENISON AND YOUR HEALTH

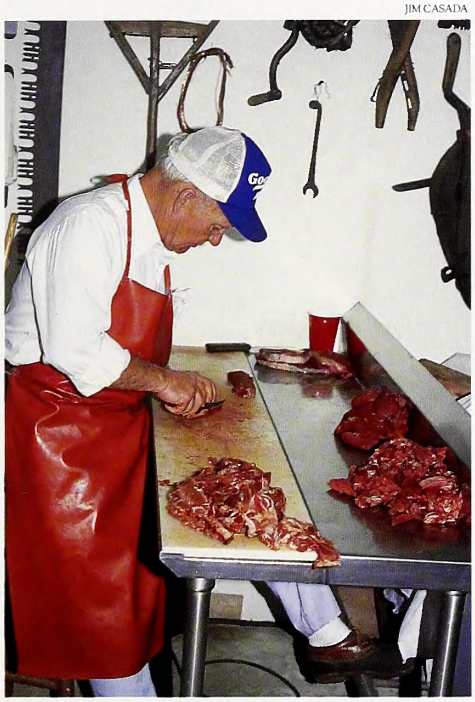
Simply put, venison is good for you. It has less cholesterol than beef, and much of that is what is sometimes termed "good" cholesterol. It is highly nutritious, quite lean and indeed the only red meat that many heart patients are allowed to eat. It also contains far fewer calories than beef (a 4-ounce cut has about 185 calories, compared to 320 calories in a comparable-sized piece of beef tenderloin).

You can take additional steps to make sure the venison you eat is even healthier, and while you are doing this, you will get tastier meat as well. Most of the cholesterol content of venison (and other meats) is found in fat and in the membranes of muscle cells. In other words, get rid of as much fat, "silver skin" and membrane as you can. The meat will taste better and be better for you.

One other health-related matter needs to be stressed, and surprisingly few folks know about it. Any woman who is pregnant is advised to avoid eating venison or even having contact with the meat during the course of her pregnancy. This is because of a fairly common, though often misunderstood, disease known as toxoplasmosis. It is most commonly acquired through eating undercooked meat including pork, lamb

For a small fee, *your local butcher will process your dressed deer into roasts, steaks, ground meat, stew meat and ribs. For better flavor, a deer should be allowed to hang in a meat locker for a couple of weeks before it is processed.*

JIM CASADA



JODY DUGGINS

and venison. But it can also be contracted simply by handling raw venison. Any woman who becomes infected with toxoplasmosis during pregnancy risks major problems with the fetus she is carrying.

THOUGHTS ON COOKING

Proper aging does a great deal to break down muscle tissue and help in the tenderizing process, but there are other ways to achieve this as well. Pounding or beating individual pieces of meat prior to cooking helps, and this can be done with a meat hammer or merely by using the handle of a kitchen knife and repeatedly jabbing the cut of meat. Another way to help with tenderness is by cutting through long muscle fibers. Cubing is one way to accomplish this, but it can also be achieved by scoring or slicing across the grain of the cut of meat.

The use of acids to break down tissues—normally referred to as marinating—takes many forms. Almost any palatable liquid that contains acid—lemon, lime, tomato juice, various types of salad dressing, vinegar, wine and the like—has the potential to serve as a marinade. Many cooks like to experiment and create their own, and there are dozens of preparations available commercially. Marinades have the additional virtue of adding moisture.

One other way to tenderize venison, and it also helps avoid overly dry meat, is pressure-cooking. In general, though, pressure-cooking has a negative effect on the meat's taste; use of a Crock-Pot for tough cuts and stew meat is a much better approach. It will work wonders while enhancing flavor, especially if some herbs or spices are added.

Finally, when it comes to general advice on cooking, the greatest of all sins with fine cuts of venison is overcooking. A good rule of thumb is this: If it isn't red (or at least pink) in the middle, it's on the way to being ruined. Cook a choice piece of back strap until it is charred black on the outside and cooked through on the inside, and you will have a tough, tasteless waste of meat. Also, don't expect venison to taste like beef. It's a different flavor, but one that is at least as delightful on the table when properly prepared. With that in mind, let's conclude with a sampling of recipes that feature various cuts of venison and different ways to prepare them. ⊠

Jim Casada has written or edited (often in company with his wife, Ann) a number of game cookbooks. These include The Complete Venison Cookbook *and the award-winning* Wild Bounty.

JODY DUGGINS

PASTA E FAGOLI

½ cup chopped onion
2 garlic cloves, minced
½ cup chopped celery
½ cup grated carrots
2 tablespoons olive oil
1 (14-ounce) can chicken broth
½ pound ground venison, browned
2 (14-ounce) cans diced tomatoes
1 (8-ounce) can tomato sauce
1 (16-ounce) can red kidney beans
1 (19-ounce) can white kidney beans
1 cup cooked ziti
½ teaspoon black pepper
1 teaspoon parsley
½ teaspoon basil
1½ teaspoons Italian seasonings

Sauté onion, garlic, celery and carrots in olive oil until tender crisp. Add chicken broth and simmer. Brown ground venison. Add browned venison, diced tomatoes and tomato sauce. Drain and rinse red and white kidney beans; add to soup. Cut ziti with scissors; add to soup. Add seasonings. Simmer for 20 to 30 minutes. Makes 4 quarts. Top with freshly grated Parmesan cheese when served.

PAPRIKA VENISON

⅓ cup butter or margarine
1 teaspoon salt
½ cup water
1 large onion, chopped
2 pounds boneless venison stew meat
2 tablespoons flour
2 garlic cloves, minced
1 tablespoon paprika
1 cup sour cream
chopped pepper to taste

Melt butter in a Dutch oven. Add onion and garlic. Cook until tender but not brown. Remove from Dutch oven and set aside. Brown meat in remaining butter over moderate heat. Add paprika to meat and butter and stir for 1 minute. Return onion and garlic, and add salt, pepper and water. Cover and simmer for 2 hours. Add more water if necessary. Combine flour and sour cream, stir into meat mixture and cook until smooth and thickened. Do not boil. Serve with pasta or gnocchi. Serves six.

LEMON PEPPER VENISON STEAK

4 slices bacon
10 (inch-thick) venison steak cutlets
½ large onion, chopped
juice of a lemon
1 tablespoon sugar
lemon pepper

Fry bacon in a cast-iron skillet. Remove slices from pan, leaving 2 tablespoons drippings in skillet, and reserve remaining grease. Add onion to drippings and sprinkle with sugar; cook until onion is tender. Remove onion and return reserved grease to skillet. Place cutlets in skillet; squeeze small amount of lemon juice on each cutlet and season with lemon pepper. Cook quickly; meat is best if cutlets are slightly pink in the center. Add crumbled bacon and onion to cutlets and reheat. Serves three or four.

PARTY MEATBALLS

1½ pounds ground venison
½ cup dry bread crumbs
½ cup milk
1 egg, beaten
¼ cup onion, finely minced
1½ teaspoons salt
¼ teaspoon pepper
¼ teaspoon garlic powder
1 (10-ounce) jar red currant jelly
1 (12-ounce) jar chili sauce

Mix all ingredients except red currant jelly and chili sauce, and shape into balls. Place in a baking dish and brown in a 350-degree oven for 30 minutes. Then heat the red currant jelly and the chili sauce in a large skillet. Add meatballs and simmer for 30 minutes. Transfer to a chafing dish and serve hot.

Tip: This recipe can be doubled or tripled for large groups, and leftovers keep well for meatball subs.

JIM CASADA

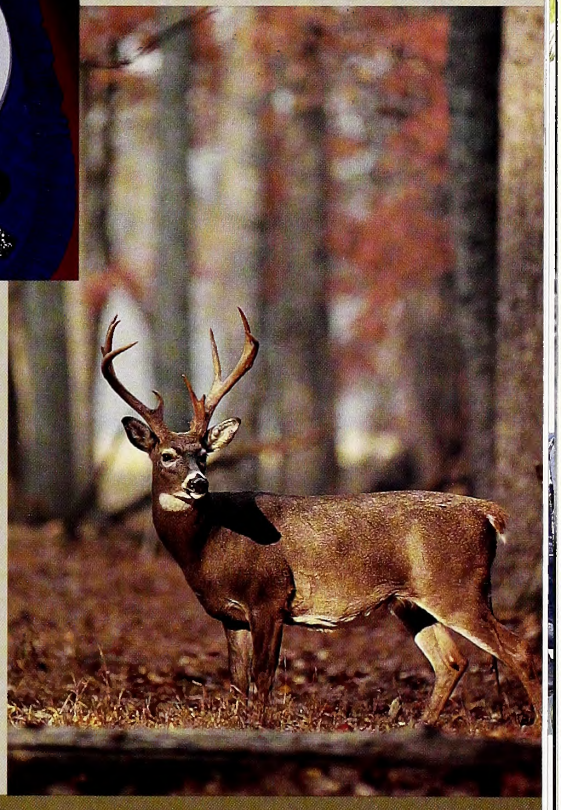
CROCK-POT CHILI

½ pound dried pinto (or kidney) beans
2 (28-ounce) cans whole tomatoes
1 large green pepper, chopped (optional)
1 large onion, chopped
salt and pepper to taste
1 clove garlic, minced
2½-3 pounds ground venison
3 tablespoons chili powder
3 tablespoons cumin

Soak beans overnight. Simmer until soft. Drain and place in Crock-Pot. Add tomatoes, green pepper, onion and garlic. Brown venison, drain if necessary and add to Crock-Pot. Add chili powder and cumin (and other seasonings if desired). Mix thoroughly. Cover and cook on low for eight to 14 hours or on high for four to five hours. Taste for seasonings and adjust. Serve with grated cheese, chopped onions and sour cream.

Tip: Good with crackers, with homemade bread or in a taco salad.

WILLIAM S. LEA



COOKING TIPS

1. A little-known aspect of cooking venison is that it blends nicely with various fruits and berries. For example, try topping steaks with blueberries at the last moment before taking from the pan or grill, or try a cherry sauce atop roasts. Cranberries and apricots also marry well with venison.
2. Almost any recipe that features beef can also be prepared using venison.
3. Try blending venison sausage and ground venison in recipes for chili or add a bit of sausage to stews for a flavor treat.
4. Try a variety of herbs with your venison dishes. Among those that work well are cumin, basil, chives, garlic chives, garlic, chili and oregano.
5. Venison is great on the grill—from steaks to kabobs, roasts to burgers. Just remember not to overcook.

Chasing Rainbows

written by David S. Lee
photographed by R. S. Simmons

Although they lead to no pot of gold, rainbow snakes compel a lifelong quest.

Friends would question my sanity. Not because I was hunting snakes—I spend a good portion of my free time in pursuit of lowly creatures—but because I was doing this in February, through dusk and a cold rain. I drove 20 mph over a lonely road that bisected miles of coastal Carolina freshwater and estuarine marshes. By 9:30 I had lost track of my passes on this 15-mile stretch of road. The wipers flapped across the windshield as I squinted at the zone where the headlights best illuminated the wet asphalt. It was a good night to be out.

The particular snake I was seeking was the rainbow snake, a rare aquatic species indigenous to the southeastern United States. I really wanted to find one of the snakes, as I have since I was a kid growing up in Maryland, the species' northernmost limit.

Several decades back, we bought a piece of property on South River in Bladen County. It has about a mile of river frontage, and about 40 percent of the land is cypress river swamps bisected by a number of small, spring-fed creeks. Ideal habitat. And though the potential for rainbow snakes was not the driving force in the acquisition, I must admit that these snakes were a factor. I have no idea how many hours I have spent—day and night and all seasons of the year—exploring our land, cataloging what lives on it and even doing a few small research projects. And I've never seen the hint of a rainbow snake. But I would be very surprised to learn they are not there.

What makes rainbow snakes so difficult to find? They're not small; adults occasionally reach 5 feet or more. But a combination of the species' behaviors makes one wonder how any have ever been found at all.

Like any number of snakes, rainbow snakes are nocturnal, which both gives them the edge of darkness and puts them on the move at times of day when we humans are normally indoors. Add to this the fact that they are aquatic or at least semiaquatic, which places their activity in places we don't frequent. The real kicker is their burrowing behavior. When on land, or even at the water's edge, these snakes are subterranean. We are not talking about living beneath leaves or debris or under logs, but deep underground burrowing. Accounts abound of rainbow snakes plowed up in wet organic fields and uncovered by earth-moving equipment. The motherlode from North Carolina was six adult snakes unearthed in New Hanover County by a bulldozer 15 yards from the Cape Fear River.

JACK DERMID

A rainbow snake, left, protects its clutch of newly laid eggs. The time-lapse photos at right depict a rainbow snake hatching.

Their diet is specialized. Adults feed mostly on American eels. Captive rainbow snakes will occasionally eat amphibians, and it is likely that salamanders, frogs and tadpoles are the principal diet of the young, but this is not confirmed. Mud snakes, which are closely related to rainbow snakes and also live in the Coastal Plain of North Carolina, are much more common—or at least encountered more often. They are approximately the same size and live in similar habitats, but their principal prey consists of large, eel-like amphibians such as amphiumas and sirens.

The tails of both mud and rainbow snakes end in blunt, hard points, which the snakes will press into your hand or arm when you pick them up. It's entirely harmless; the force is not of a magnitude to cause pain. This behavior, which may actually help both species hold down the large and slippery prey on which they feed, led to the myth that these snakes' tails can sting. They are still known colloquially by some as "stinging snakes" or "horned snakes."

This genus of snakes provides the kernel of truth behind another common myth. Mud snakes often arrange their bodies in a large, loose coil. The resting position has led to the myth of the "hoop snake," a serpent that can chase a person downhill by rolling in a hooplike manner. Some versions of the tall tale combine both myths: The snake gathers momentum rolling downhill, springs into the air and stings its prey with its tail. If the snake stung a tree, its leaves would immediately drop off.

An interesting form of locomotion, but one that is sadly untrue. Neither rainbow nor mud snake is, of course, poisonous. They can't be induced to bite even in captivity. Their actual methods of locomotion are far more interesting than the fables and lore.

Duct-tape your legs together and your arms to your sides. Lie on the floor. Now, imagine how you are going to make a living. "The way of the snake upon a rock" is one of four phenomena described in the book of Proverbs as being beyond understanding. Imagine how complex the muscle actions must be to crawl out of your own outer skin without using your hands. Because snakes lack limbs, their entire body has become an organ of locomotion.

To assist in movement, the body of the snake has become very elongated, which in turn forced some strange rearrangements of the internal organs. With snakes, the number of vertebrae is increased, which allows the entire body to become not just long but very flexible. While typical mammals have 16 or so trunk vertebrae, snakes have 100 to 400. Rainbow snakes have about 175. Each of these anchors a pair of flexible ribs, which stretch all the way down the sides of the snake's body. The vertebrae are so constructed that each one can flex about 28 degrees up or down and 50 degrees from side to side.

Mud and rainbow snakes are less flexible than most. Probably their stout bodies reduce their ability to twist and bend.

I would like to say that the goal of my road-driving snake hunts is to watch how rainbow snakes move across wet asphalt. But in all honesty, if I ever find one of these elusive snakes, it is unlikely that I would spend much time admiring its movements. I would probably take any number of photographs, but certainly the snake would be released soon after capture. This rainbow chasing is true foolishness, and I think by now I have elevated it to a meaningless, addictive art form.

What is worse than not finding a snake as rare as a rainbow is finding one squished. When I discovered it was indeed a rainbow snake, I was overcome with disgust but excited, too. It was only 10 p.m., and the kill was fresh. At least the snakes were on the move. I scoured that stretch of road for at least another four hours, toying with the speed, the wipers, the high beams—trying to find the perfect combination. I kept thinking that if I had just gotten to that spot 10 minutes sooner. . . .

I never saw another one, and I don't actually know what time I called it a night.

What on earth had made me so fixated on catching this particular snake? It's not the iridescent beauty of the rainbow snake; some of the western North American rat snakes and milk snakes are every bit as colorful as rainbow snakes. And rainbow snakes don't make good pets, typically dying in captivity in less than a year.

My quasi-obsession goes back to Bob Simmons. In addition to his dental career, Doc Simmons was a renowned nature photographer. This was in the days before automatic cameras and dedicated lenses. He used flashbulbs, 25 ASA film and patience. His main subjects were reptiles and amphibians.

One day he came over to my house to show off an amazing series of photographs illustrating many different aspects of rainbow snake life history. The photographs showed a remarkably colored snake, and Doc's Leica camera had captured the reflective sheen of the scales well. On a trip to Florida, not only had he caught one to photograph, but it was also a gravid female. The snake laid eggs, the eggs hatched, and the whole sequence was, over time, captured on 35 mm film.

The images stuck with me. A few years later, when field guides of reptiles came on

the market, I would always pause on the page illustrating rainbow snakes.

Even when they are shedding their skins, rainbow snakes are beautiful and appropriately named. Bob Simmons had photos of the snakes before, during and after shedding. Like most snakes, rainbow snakes look somewhat drab just prior to shedding, and their eyes become cloudy. Prior to shedding, snakes may be nearly blind, the eye becoming bluish opaque for one or two weeks before molt. Fluid under the skin and under the scales covering their eyes loosens the outer skin.

Rubbing, contracting its muscles and stretching, the snake proceeds to crawl out of its skin. The process normally takes less than half an hour. The old skin, which looks like scaled cellophane, is worked backwards over the scaled head and body, causing the discarded slough to end up wrong-side-out and directed opposite from the way the snake actually crawled. The shedding of the outer skin allows the reptile to grow in both length and girth. Most snakes shed soon after they appear in the world; food from their yolk sac has already made them too big for their natal skins. They will shed several times a year and, for temperate species, soon after hibernation.

After a few more years of unsuccessful rainbow hunts, I may lower my standards to just finding a shed skin. We'll see.

Twenty-five years ago, when I first moved to Raleigh, the exhibits department at the North Carolina Museum of Natural Sciences was in a frenzied upgrading of our displays. One afternoon, on my way to my office, I saw the tail end of a snake protruding from a trash container. It was a stuffed rainbow snake. Though a bit on the plump side as snake taxidermy goes, it was not a bad effort for the 1920s. But time had taken its toll, and the paints had faded under decades of exhibit lighting. The serpent's colors were correct, but the glossy iridescence, if it had ever been captured at all, was long lost.

It's not the colors of the rainbow snake that make it attractive. The object I was holding, while colorful, was one of the ugliest "snakes" I have ever encountered. Colorful, like tasty, does not always imply something good.

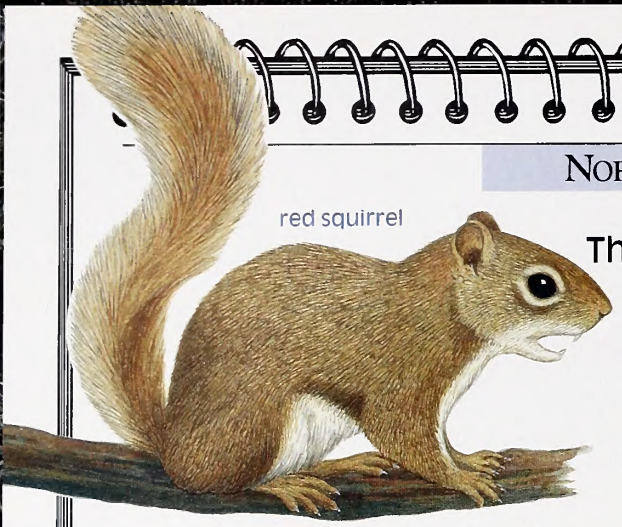
I kept the snake. It looped across a windowsill in my office for more than 20 years, reminding me of my unfulfilled quest and of man's inability to duplicate the subtleties of nature.

Recently, I attended a meeting where the room was full of serious amateur and professional herpetologists. When the speaker asked how many of us had ever found a rainbow snake, maybe 20 hands went up. Fewer than 15 percent of us had even seen one in the wild. I wondered how many thousands and thousands of hours of field time spent within the range of this snake those few hands represented. How many miles of rainy roads? How many overturned logs?

When you get right down to it, there are a handful of species that make certain places seem wild and special. Next February and early March, I will again be watching weather forecasts, trying to pick a night when rainbows might be on the prowl. The flaw in this approach is that the snakes' movements are likely to be more precise than weather forecasts. So even if I knew the exact environmental conditions to look for, I still could only hope for a match. After a lifetime of indeterminate searching, it is clear that for me, luck is not a factor. Eccentricity and persistence appear to be the necessary ingredients for finding this particular snake. How can I fail? ⊠

Even when shedding *its skin, the rainbow snake is aptly named.*

David S. Lee is a curator of birds at the N.C. Museum of Natural Sciences.



red squirrel

They burrow! They climb! They glide through the air! Take a closer look at North Carolina's

Seven Super Squirrels

written and illustrated by Consie Powell
nature activity by Anne M. Runyon

North Carolina is home to seven species of squirrels. The **diurnal** gray, fox and red squirrels, and the **nocturnal** northern and southern flying squirrels have adapted to **arboreal** life, while chipmunks and woodchucks have adapted to living in burrows.

FURRY BURROWERS

When someone says "squirrels," you probably don't think of chipmunks or woodchucks. If you live in the northeast Coastal Plain, central Piedmont or Mountains, you've probably seen these two ground squirrels. In deciduous woodlands and forest edges rich with rocks, stumps and crevices, eastern chipmunks make burrows. These tunnels and chambers are where they hoard food, rest and escape from danger. Chipmunks are easy to spot, but you'll have to look hard to find the hidden entrance to one's underground burrow.

A woodchuck burrow is easier to find. This large, squat squirrel—sometimes called a "groundhog"—makes its burrow beneath rocks, stumps or even the foundations of buildings. Woodchucks live along edges of brushy woodlands, especially along fields, roads or streams. In spring, they frequent the edges of rural roadways, feasting on the succulent dandelions, clover and other grasses and greens that grow there.

WINTER SLEEP

Both chipmunks and woodchucks are solitary, diurnal rodents that spend winter deep in their burrows. A woodchuck eats enough during summer and early fall to put on huge fat reserves. It lives off this fat during winter **hibernation**. Curled in a tight ball, a hibernating woodchuck lowers its body temperature from 90 degrees to near the temperature of its **hibernaculum**. Its heartbeat drops from 75 beats per minute to about four. The woodchuck seems lifeless, but in February or March, as outside temperatures warm, it gradually awakens.

Chipmunks don't grow fat to get them through winter. Instead, they hoard large quantities of food in their underground burrows. Curled atop a mattress of seeds, a chipmunk goes into **torpor** for several days at a time; its body temperature, heart rate and breathing all slow down. Every few days the chipmunk rouses, eats a bit and may even emerge above ground. Then back down it goes to pass the coldest part of winter sheltered in its cozy burrow.

A chipmunk transports seeds and other food to its burrow in internal cheek pouches.

eastern chipmunk

EVERYBODY'S NEIGHBOR

Found throughout North Carolina, the gray squirrel is probably the most familiar and visible mammal in the state. Gray squirrels prefer mature oak, hickory, beech and other hardwood forests. They are found just about anywhere adequate food and shelter can be found, except in high elevations or open oak-pine habitats. They nest in tree cavities or a mass of leaves and twigs high in the branches. At night or during bad weather, several squirrels may share a nest, where they groom each other and stay warm.

Foods vary with the seasons. In spring gray squirrels eat buds, twigs, flowers and sap, then in summer add fruits, seeds, berries and mushrooms to their diet. In late summer, fall and early winter, they consume nuts, seeds and fall fruits while busily burying nuts and acorns. These buried nuts provide food for the squirrels all winter long.

Though squirrels and other rodents frequently have various internal and external parasites, gray and fox squirrels rarely have tapeworms or roundworms. This is because the acorns they eat have large amounts of tannins, a plant substance poisonous to many animals, including those worms.

gray squirrel

PRETTY FOXY

Larger than gray squirrels, fox squirrels live in the southeast Coastal Plain, the Sandhills and a few isolated mountain areas. Though similar to grays in food habits, nesting and reproduction, fox squirrels are not quite so agile and spend far more time on the ground foraging and traveling between trees. They prefer open habitats with scattered trees and open understory, and are most often found in North Carolina's mature forests of longleaf pine and oak. Their larger size enables them to carry and glean seeds from the large longleaf pine cones.

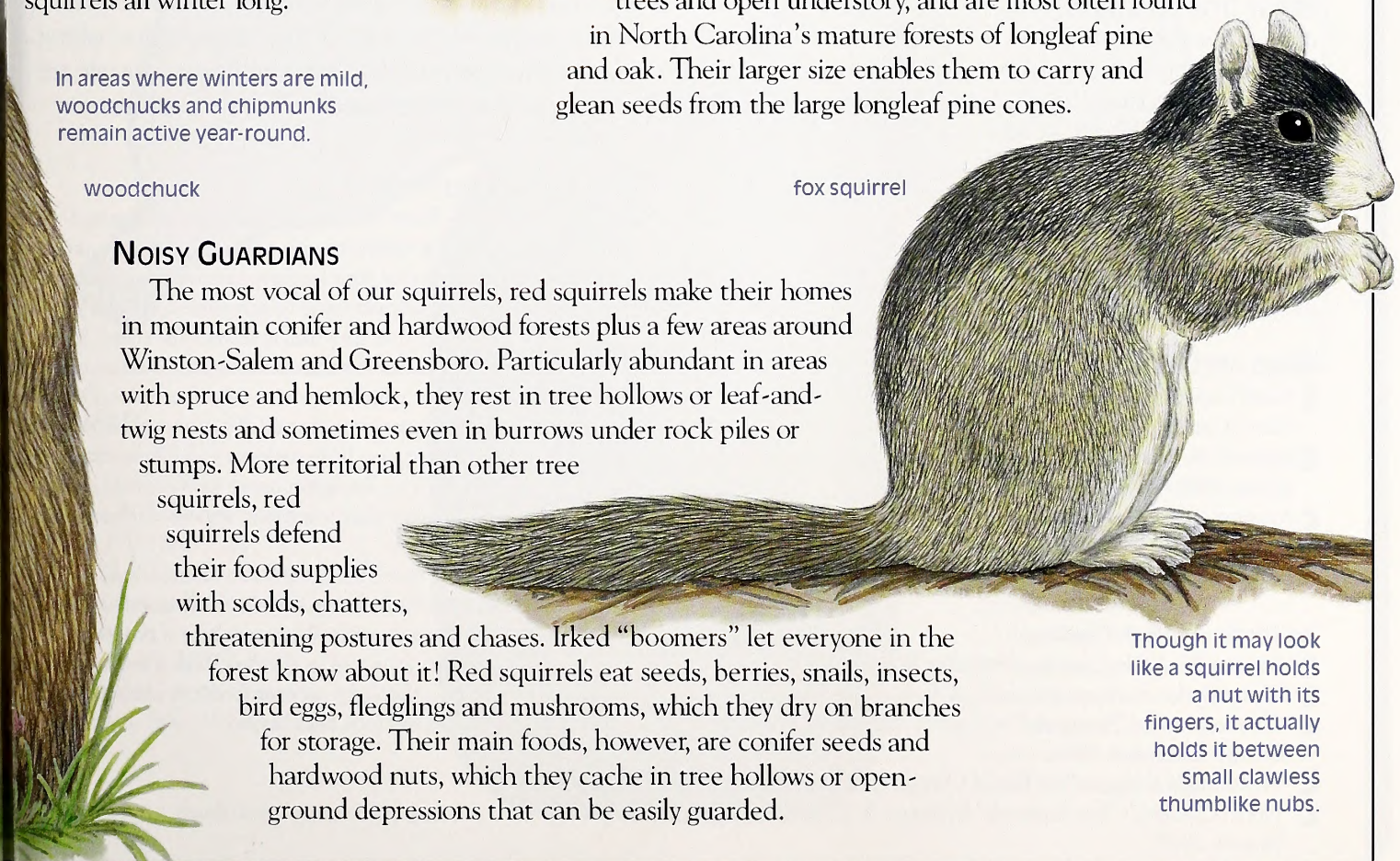
In areas where winters are mild, woodchucks and chipmunks remain active year-round.

woodchuck

fox squirrel

NOISY GUARDIANS

The most vocal of our squirrels, red squirrels make their homes in mountain conifer and hardwood forests plus a few areas around Winston-Salem and Greensboro. Particularly abundant in areas with spruce and hemlock, they rest in tree hollows or leaf-and-twig nests and sometimes even in burrows under rock piles or stumps. More territorial than other tree squirrels, red squirrels defend their food supplies with scolds, chatters, threatening postures and chases. Irked "boomers" let everyone in the forest know about it! Red squirrels eat seeds, berries, snails, insects, bird eggs, fledglings and mushrooms, which they dry on branches for storage. Their main foods, however, are conifer seeds and hardwood nuts, which they cache in tree hollows or open-ground depressions that can be easily guarded.



Though it may look like a squirrel holds a nut with its fingers, it actually holds it between small clawless thumblike nubs.

northern flying squirrel

MINIATURE HANG GLIDERS

With large eyes and finer, silkier fur than other squirrels, nocturnal flying squirrels are seen far less frequently than their diurnal cousins. Like other arboreal squirrels, flying squirrels scamper and climb as they forage on the ground and in the trees, but they also glide between trees. When a flying squirrel launches itself into the air, it extends its legs and stretches a loose flap of skin called the **patagium** to make a broad gliding surface. Cartilage supporting the patagium at the wrist helps in steering, and the broad, flat tail acts as a stabilizer and rudder.

Though common over much of northern North America, the northern flying squirrel occurs in North Carolina only in spruce-fir or mixed conifer-hardwood forests above 5,000 feet in elevation. It eats seeds, nuts, fruit, lichens, fungi, bird eggs, insects and other invertebrates, occasionally scavenging small dead birds and mammals.

Southern flying squirrels live at lower elevations throughout North Carolina in coniferous and hardwood forests, as well as in wooded urban parks and residential areas. The southern flying squirrel is smaller than its northern cousin but is also more aggressive. In areas where both species exist, southern flying squirrels may be displacing their northern cousins. In addition, the southern flying squirrel carries, but is not affected by, a parasitic roundworm that weakens and injures the northern species. Because of those factors plus habitat alteration by humans, northern flying squirrels are listed as "threatened" in North Carolina.

What Does It Mean?

diurnal: active during the day
nocturnal: active during the night
arboreal: living in trees
hibernation: spending the winter in a dormant condition
hibernaculum: shelter or place where an animal hibernates
torpor: a state of inactivity
patagium: the flap of skin that enables a flying squirrel to glide

southern flying squirrel

Read and Find Out

- *North Carolina WILD Places* edited by Lawrence S. Earley, North Carolina Wildlife Resources Commission, 1993.
- *Squirrels: A Wildlife Handbook* by Kim Long, Johnson Books, 1995.
- *Mammals of the Carolinas, Virginia, and Maryland* by Wm. David Webster, James F. Parnell and Walter C. Biggs Jr., University of North Carolina Press, 1985.

In *Wildlife in North Carolina:*

- "Treetop Rivals" by Lawrence S. Earley, February 1984.
- "Those Bodacious Boomers" by Rick Estes, November 1985.
- "Phantoms of the Pinelands" by Peter D. Weigl and Terry S. Sharpe, December 1986.
- "Fly by Night Refugees" by Peter D. Weigl, February 1990.
- "North Carolina's Tree Squirrels" by Roger A. Powell, January 2000.

Get Outside

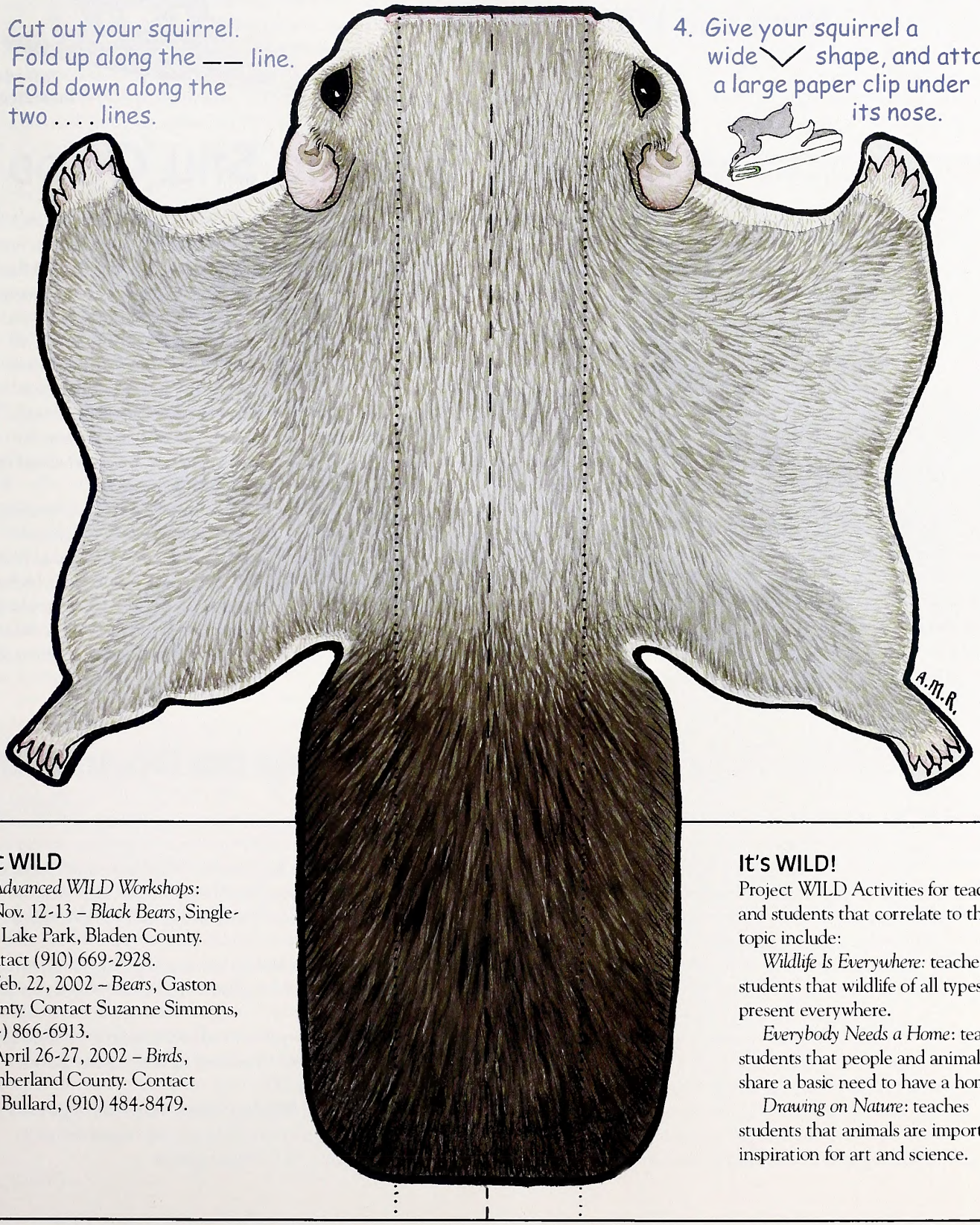
Get to Know Squirrels: People often get irritated with squirrels for raiding their bird feeders. Find a squirrel-proof feeder for your feathered friends, but also accept that squirrels will come to accessible feeders. Put out things that they like, and welcome them. If you watch squirrels carefully as they eat, you may notice things that will allow you to tell them apart. Does that one have a scruffy tail? What about that scar on the forehead, or a little rip in an ear? Once you know who's who, it's a lot of fun to see who comes to your feeder, who likes what foods best and who's the pushiest squirrel of the lot.

If you want to see flying squirrels, chances may be better than you think. If you live in a fairly wooded area, watch your feeders at night. When you hear a pitter-patter of small feet across your roof in the dark, wait a few seconds, then quietly shine a flashlight on your feeder. If you're lucky, a pair of big, dark eyes will look back at you.

Editing and design by Consie Powell.

Make Your Own Southern Flying Squirrel Glider

1. Cut out your squirrel.
2. Fold up along the —— line.
3. Fold down along the two . . . . lines.
4. Give your squirrel a wide ﹀ shape, and attach a large paper clip under its nose.



Get WILD

Advanced WILD Workshops:

Nov. 12-13 – *Black Bears*, Singletary Lake Park, Bladen County. Contact (910) 669-2928.

Feb. 22, 2002 – *Bears*, Gaston County. Contact Suzanne Simmons, (704) 866-6913.

April 26-27, 2002 – *Birds*, Cumberland County. Contact Kay Bullard, (910) 484-8479.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

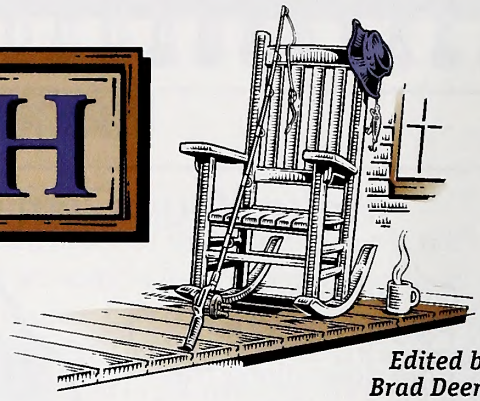
Wildlife Is Everywhere: teaches students that wildlife of all types is present everywhere.

Everybody Needs a Home: teaches students that people and animals share a basic need to have a home.

Drawing on Nature: teaches students that animals are important inspiration for art and science.

BACK PORCH

News and Wildlife Notes



Edited by Brad Deen

Ducks Wane, But Hunting Still Good

Populations have decreased in nine of the 10 most common duck species, the U.S. Fish and Wildlife Service reported, most likely because of dry weather in the upper Great Plains.

MELISSA McGAW

But experts predict that enthusiasts in eastern states probably will not notice a difference this year.

The Fish and Wildlife Service's annual report of breeding duck numbers estimated an overall 14 percent decline this spring—36.1 million birds, compared to 42 million in 2000. Some species' numbers declined more than 20 percent—redheads and both blue-winged and green-winged teal.

The population drop was in spite of an 18 percent increase in the number of ponds on the ducks' breeding grounds. "This is an unusual result," said Bruce Batt, chief biologist for Ducks Unlimited. "Normally, we see pond and total duck numbers moving in the same direction."

Batt explained the incongruity as the result of wet weather and bountiful habitat in the eastern breeding grounds—the Dakotas and Manitoba—but especially dry conditions in the western plains—Montana, Saskatchewan and Alberta. The weather has been "so much drier than usual on some of the birds' most important breeding grounds," he said, "that habitat gains in the eastern prairies are overwhelmed by losses further west."

That east-west split will translate into distinct regional differences for duck hunters and bird watchers. "People in the East will probably have a similar fall flight to last year, which was good," Batt said. "But as always, weather will be the main factor guiding the fall migration."

Waterfowl Game Land Getting an Upgrade

One of the N.C. Wildlife Resources Commission's newest waterfowl impoundments is receiving significant improvements.

With a $1 million grant from the North American Wetlands Conservation Act, Ducks Unlimited contributed an additional $250,000 to improve the existing impoundment system on the J. Morgan Futch Game Land. Formerly known as the Little Alligator River Game Land, the 600-acre tract is located on the south side of U.S. 64, about eight miles east of Columbia in Tyrrell County.

The enhancements will include 18,000 feet of new levees to establish units within the existing impoundments. A water pump and a deep well will allow water-level management in each of the subdivided units. Work should be completed by the end of the year.

"Given its location along the wintering migration route for waterfowl, the game land provides a tremendous refuge for waterfowl during the winter months to forage, as well as good hunting access to the general public," said Shawn Kooyman, regional engineer for Ducks Unlimited.

The Wildlife Commission plans to manage the impoundment by creating flooded fields, moist-soil vegetation, mud flats and submerged aquatic beds. Numerous waterfowl are expected to benefit from the improvements, including pintails, mallards, teal, greater and lesser scaup, tundra swans and Canada geese.

—Chris Powell

Nature's Ways

Brothers' Keepers

WRITTEN BY CLYDE E. SORENSON
ILLUSTRATED BY DAVID WILLIAMS

Trumpet creeper is a common roadside plant that climbs exuberantly up telephone poles and over old barbed-wire fences. In the summer, it is easy to recognize by its large, red, trumpet-shaped flowers and pinnate leaves. This time of year, however, the vines are recognizable by 4- to 8-inch pods dangling from their bare branches. These pods and the seeds within are the only host for the larvae of a curious little brown-and-violet moth.

Clydonopteron tecomae emerge from early spring through summer. The summer females lay their eggs in green pods, where developing seeds provide food for the larvae. As fall approaches, the caterpillars tie the two halves of the mature pod together with silk. Then they settle in for the winter. Uninfested pods split, spilling their winged seeds, and eventually fall.

When the spring adults emerge, fresh pods are still months away. However, the pods tied together last fall—the very pods the spring flight just left—are still around. Most still contain many uneaten seeds, and so the females lay their eggs in those tied-together pods. If not for the action of last summer's larvae, no habitat would exist for the spring generation.

LETTER TO THE EDITOR

Dear Wildlife,

I enjoyed reading your informative article, "Roanoke River Incorporated," in the June issue of *Wildlife in North Carolina*.

We agree that the system for siting industry in the Roanoke needs to be re-evaluated. Industry news out of Raleigh, at least as it affects the Roanoke, promotes the economic benefits of the new industry and gives little, if any, consideration to environmental impacts. This presents particular risks in the Roanoke, where the economic situation often makes it more susceptible to a short-term focus on jobs and tax revenues.

We support responsible use of the waters of the Roanoke for in-basin economic development, but we feel that the current system for the siting of industry fosters confrontation and hostility rather than a fair assessment of both the economic and environmental impacts of proposed industry.

Tom Brawner, executive director
Roanoke River Basin Association

Reefs Attractive to Fish and Fishing

It may be artificial, but the fishing is real—and with fewer pesky snags than either natural or other manmade structures.

Fisheries technicians from the N.C. Wildlife Resources Commission have been seeding Piedmont lakes with a new kind of artificial reef. Also called fish attractors, these instant honeyholes provide habitat similar to submerged trees, dock pilings and other underwater structure. And as any successful angler of crappie or largemouth bass can attest, those are the spots to sink a hook.

BRAD DEEN

***Glenn Kimbrell,** right, and David Hart sink a fish attractor in Jordan Lake.*

Artificial structure is nothing new, of course. But now the attractors are as attractive to fishing as to fish.

"The idea came from years of trial and error," said fishery technician Glenn Kimbrell, who designed the barrel-and-pipe structures.

Having used and rejected everything from recycled Christmas trees (tinsel can be hazardous, and needle loss reduces shade and cover) to galvanized signposts (rust and snags), Kimbrell settled on a design that resembles giant Tinkertoys.

The blue plastic barrels, cut in half lengthwise, initially held raisin juice concentrate. "You don't want harsh chemicals to go in the lake," he said.

The half-barrels swivel on PVC pipes, preventing hooks from snagging. Plumber's glue and furniture-grade PVC couplings connect the pipes. The four bottom corners are cemented into concrete blocks that anchor the reef to the lake bottom.

Orange-and-white buoys that mark the attractors are seldom directly over them. Because lake levels rise and fall, the cable that tethers the buoy to the attractor can have up to 15 feet of slack. Use a fish locator to find the structure.

Since 1999, technicians have placed 19 attractors in Jordan Lake and 29 in Falls Lake. Fishing maps available at guide and tackle stores indicate their locations. Other lakes are under consideration.

—Brad Deen

Eagles Nest Amid Lake Development

A fight to protect bald eagles at Lake James has pitted conservationists against both a developer and federal wildlife officials.

The eagles are the only known nesting pair in western North Carolina in 40 years. They have nested in a towering white pine beside the lake since 1999 and raised their first chick to maturity this year.

JANE ROHLING

Because of their "threatened" status, bald eagles enjoy federal protection. The U.S. Fish and Wildlife Service generally forbids development within 750 feet of a nest.

Buffers, however, would have taken out nine lots owned by a development subsidiary of Duke Energy Co. Crescent Resources plans to build a 450-lot subdivision called South Pointe on the lakefront. This spring, Crescent applied to the U.S. Fish and Wildlife Service for a permit allowing it to disturb the nest site.

Crescent offered to create six alternate nesting sites scattered over 11,700 acres it owns around Lake James. Satisfied, the Fish and Wildlife Service allowed construction on all nine lots, including the one on which the nest tree stands. The permit also shortens the no-construction zones around bald eagle nest sites to 300 feet.

Fish and Wildlife officials noted that bald eagles are making a comeback. In North Carolina, their numbers have ballooned from two nests in 1989 to 34 today.

A coalition led by the Southern Appalachian Biodiversity Project has filed suit in federal court against both the developer and the federal agency. That case is pending.

Crescent, meanwhile, has proposed an adjoining, 174-lot subdivision — called Eagle Crest.

Calendar of Events

Thursday-Saturday, Nov. 1–3
The Seventh Annual Bucks for Bertie, a guided deer hunt, raises funds for Bertie County Schools. Call (252) 794-6034.

Friday-Sunday, Nov. 2–4
Wings over Water, an annual festival celebrating coastal wildlife, offers bird watching, kayak tours, workshops and more. Call the Outer Banks Chamber of Commerce, (252) 441-8144, or log onto www.northeast-nc.com/wings.

Saturday, Nov. 3
The Mattamuskeet Fun Ride includes bicycle courses of 35, 45, 55 and 70 miles, all beginning and ending at Mattamuskeet Lodge in the National Wildlife Refuge. Call the Greater Hyde County Chamber of Commerce toll-free at (888) 493-3826, or e-mail hydecocc@beachlink.com.

Saturday, Nov. 3
A free course on reading topographic maps for hiking is offered by the Pisgah Center for Wildlife Education, Pisgah Forest. Call (828) 877-4423.

Saturday-Sunday, Nov. 3–4
The N.C. Herpetological Society will hold its fall meeting at the N.C. Museum of Natural Sciences in Raleigh. Call (919) 733-7450, ext. 754 or 561.

Saturday, Nov. 10
The Cape Hatteras Anglers Club Individual Surf Fishing Tournament in Buxton will benefit the club's scholarship fund. Call (252) 995-4253, or e-mail anglers@interpath.com.

Saturday, Nov. 17
The Manteo Rotary Rockfish Rodeo at Roanoke Island Festival Park applies proceeds toward scholarships. Call (252) 473-4268, or log onto www.rockfishrodeo.com.

Friday-Saturday, Nov. 23–24
The Anson County Big Game Hunt Tournament is a two-day contest hunt. Call the Anson County Chamber of Commerce, (704) 694-4181.

Prize of a Lifetime

JODY DUGGINS

***Marquis Riley, 10, accepts** a lifetime fishing license from John Pechmann, chairman of the N.C. Wildlife Resources Commission. Riley, of Efland, pictured with his parents, Arthur Riley and Jennifer Thompson, won the $250 prize as part of a contest for National Fishing Week, June 1-10. Another 54 children across the state won rods, reels and other fishing gear. Bass Pro Shops, the Wildlife Commission and Remington/Stren donated the prizes.*

RARE REDHORSE SPECIES DISAPPEARING

A rare species of redhorse is getting rarer, as fish biologists worry about its prospects for survival in North Carolina.

The robust redhorse, *Moxostoma robustum*, is the largest of the redhorse suckers, weighing up to 15 pounds. Although it once ranged in waters from the Carolina foothills to southern Georgia, only a few small populations are known now—in the Pee Dee River near Rockingham, and in a few Georgia rivers.

"They're on the verge of extirpation," said Wayne Starnes, research curator of fishes for the N.C. Museum of Natural Sciences in Raleigh.

Propagation programs in Georgia have been successful, but that may not be viable here. Far too few have been found in North Carolina—three since 1985—to yield a sufficient genetic mix.

JOHN CRUTCHFIELD/CP&L

The usual suspects are behind the robust's decline. Sediment and other pollutants bury its main food, freshwater mussels, and cover the rocky, shallow shoals in which redhorses spawn. Dams may block their access to upriver spawning sites. And they face competition from introduced species such as the smallmouth buffalo and the flathead catfish—both native to the Mississippi River basin and stocked in the Yadkin-Pee Dee some years ago.

With the odds stacked so high against the robust redhorse, Starnes wasn't optimistic about its chances in North Carolina.

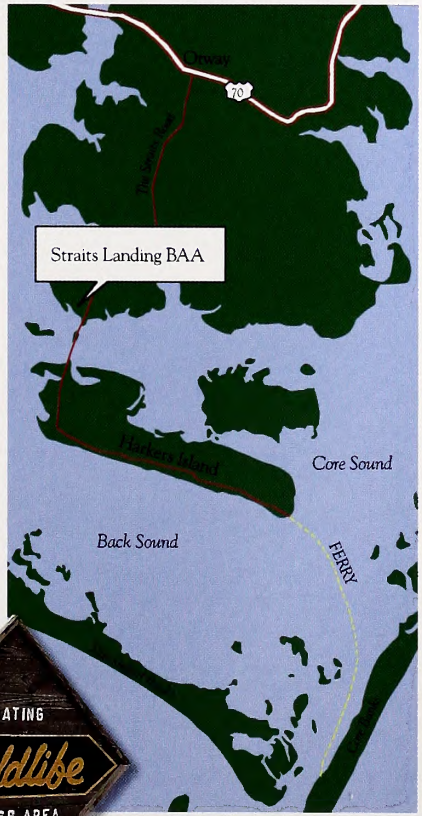
"We may be looking at extirpation, but you never know. They've been able to hold on this long," he said.

New Boating Access Opens

The N.C. Wildlife Resources Commission recently completed a new boating access area near Harkers Island, thanks to a cooperative effort between the N.C. Department of Transportation and Carteret County.

The site—providing access to Cape Lookout, Core Sound and Shackleford Banks—had originally been a storage area for N.C. DOT. However, the county found another location for equipment and materials storage, freeing up the waterfront property for the new boat ramp.

The Straits Landing Boating Access Area is adjacent to The Straits Road before the bridge leading to Harkers Island. The access includes two ramps with two fixed docks, one floating dock and 25 parking spaces, including one handicapped space. The access channel was excavated to an average depth of 5 feet.



KEN TAYLOR

On Patrol

A picture is worth 1,000 words, but a dated snapshot is priceless.

Acting on a tip, wildlife Senior Officer William Carlisle visited a Catawba County sporting goods store, where a photo was on display of a local hunter with a freshly killed deer. The hunter had lost his license for night deer hunting. The date on the photo, which the camera automatically imprinted, fell long before the two-year revocation was over.

Carlisle and Sgt. Chad Martin confronted the hunter at home. His first story was that he had killed the deer in Virginia. That story unraveled when: (a) he could not produce a Virginia hunting license, and (b) the officers informed him that killing wildlife illegally in one state and transporting it to another state was a federal violation.

He changed his story, saying a friend had given him the deer. When Carlisle pulled out his cell phone and offered to call the friend, the hunter confessed to killing the deer in North Carolina while his license was revoked.

As it turned out, he had a hunting license—obtained under false pretenses. Pleading guilty to that charge, he told the court he was "tired of being railroaded" and intended to quit hunting in North Carolina. The judge revoked his license for three more years.

Bounty a Weapon in Beaver War

Who ya gonna call? Beaver Busters—if Martin County gets its way.

A rainy year Down East has made the beaver population both abundant and apparent. Dammed streams and creeks have flooded roads and thousands of acres of timber.

THE (WILLIAMSTON) ENTERPRISE

To control the industrious rodent, 23 counties participate in the state-federal Beaver Management Assistance Program, which pays a trapper in each county. But Martin County's Board of Commissioners—pressured by landowners sporting "Beaver Busters" hats and shirts—wants to do more.

The county commissioners have proposed a bounty on beavers, which as of press time had not been formally approved. Opponents have pointed out the benefits of beaver dams, such as filtering water of pollutants and creating habitat for wetlands-dependent species.

Beaver bounties have also proven ineffective and open to fraud, report leaders in Sampson County, which had special legislation to pay bounties in the early 1990s. Trappers tended to capture the least troublesome critters, and some apparently collected bounties on beavers trapped outside the county.

And there are legal issues. As the state Attorney General's Office has informed Martin County, a bounty could constitute an illegal attempt to regulate wildlife. Only the N.C. Wildlife Resources Commission has that authority.

Private landowners who have beaver damage can trap or kill them and destroy dams, but only on the owner's property. And lodges are off-limits. The Wildlife Commission this summer turned down a request from Beaufort County to seek statutory changes allowing demolition of beaver lodges.

Martin County leaders believe they have found a loophole. State law allows counties to "abate . . . conditions detrimental to the health, safety or welfare of its citizens and the peace and dignity of the county." County commissioners cite auto crashes on flooded roads and mosquitoes breeding in standing water as public health hazards.

Catch Us at these *Numbers*

1-800-662-7137 to report violations of hunting and fishing laws

1-800-628-3773 (NC VESSEL) for boat registration and titling

1-800-675-0263 for hunting dates and shooting hours for migratory game birds

1-888-248-6834 (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone

1-800-446-8663 (I GOT ONE) to report big game harvests

Connect to the Commission's online Web site at **www.ncwildlife.org**

Calls are answered in order, but some numbers may require a wait during busy seasons.

Wildlife Endowment Fund Report

Fund Balance $44,424,979.99

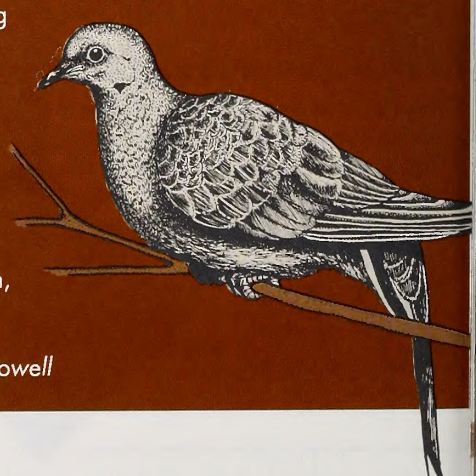
Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to Wildlife in North Carolina *magazine, as well as from tax-deductible contributions. Although the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.*

Wildlife through the Year

With leaves now rapidly falling, it won't be long before your wooded backyard will be open and bare, likely revealing a number of eyesores in the form of dead or dying trees.

But before converting that old snag into firewood, consider leaving it as a residence for wildlife. More than 550 species of birds and 300 species of mammals depend on dead or dying trees for shelter, nesting habitat or foraging areas. If you own a wooded lot or small timber tract, consider leaving trees with broken tops, trunk holes or visible nests. Also remember that fallen trees on the ground can provide valuable habitat and should not be destroyed.

Upland Gazette: If you're interested in the future of small game in North Carolina, we've got a publication for you. *The Upland Gazette* is the Wildlife Commission's newsletter discussing conservation, management and hunting issues pertaining to North Carolina's populations of quail, rabbit, grouse, dove and squirrel. For a free subscription, write *The Upland Gazette* , Division of Wildlife Management, N.C. Wildlife Resources Commission, 1722 Mail Service Center, Raleigh, N.C. 27699-1722.



— Chris Powell

N.C. WILD STORE

NEXT

in our "Sporting Heritage" poster series…

SPORTING DOGS OF NORTH CAROLINA
Trailing and Treeing Breeds

The plaintive howls of dogs hot on the scent of game—that's music to a hunter's ear. North Carolinians have valued their trailing dogs since the first English foxhounds came to the colonies in the late 1700s. Our second sporting dogs poster depicts a dozen trailing breeds—from the pint-sized feist to the regal redbone—in beautiful color. Learn their histories from the descriptions that accompany the photographs, and find out which ones tree their quarry as well. This poster includes the Plott hound, North Carolina's state dog. Poster size: 22" x 34".

$10 ITEM CODE P21

See page 38 for our Pointing and Retrieving Breeds poster.

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Salamanders of North Carolina

Explore the hidden world of some of North Carolina's most unique creatures. This poster both educates and captivates with color photographs of the 13 salamander species in North Carolina that have lungs or gills. Habitat and life cycle notes for each species accompany the illustrations (24" x 36").

$6 ITEM CODE **P19**

▲ Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina
$8 ITEM CODE **P15**

Rare Butterflies of North Carolina
$8 ITEM CODE **P16**

▶ Amphibians: Frogs of North Carolina Poster Set

Set of two posters in full color: The Hylid Frogs and True Frogs & Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom (22" x 34").

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Each poster can also be purchased individually:

Amphibians: The Hylid Frogs
$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads
$6 ITEM CODE **P14**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set (**P17**). Guide is also sold separately.

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◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds. This poster features 12 breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. (22" x 34")

$10 ITEM CODE **P18**

Sporting Dogs Poster Set. Buy both posters and save: Pointing & Retrieving and Trailing & Treeing Breeds (featured on page 37).

New

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▲ Sporting Heritage Posters

These sporting heritage posters preserve two treasured traditions. Each poster is 22" x 34".

Waterfowl Decoys of North Carolina
Descriptions of classic decoys made during the heyday of waterfowl hunting complement 19 color photographs. $10 ITEM CODE **P12**

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Color photographs of 16 trout flies accompany brief histories and detailed descriptions. $10 ITEM CODE **P13**

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Autumn Year-end Special.
Lizards, turtles and snakes—oh my! Learn to revere them rather than fear them. This set of three reptile posters features over 60 species found in North Carolina and notes those that are endangered, threatened or of special concern. Each poster is 22" x 34".

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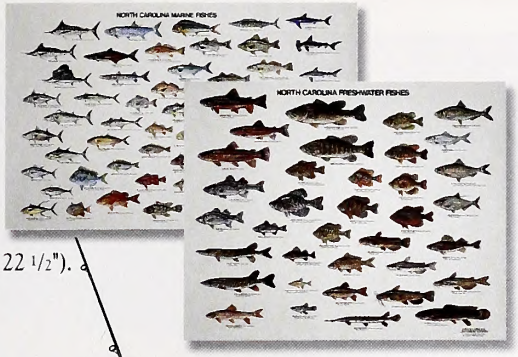

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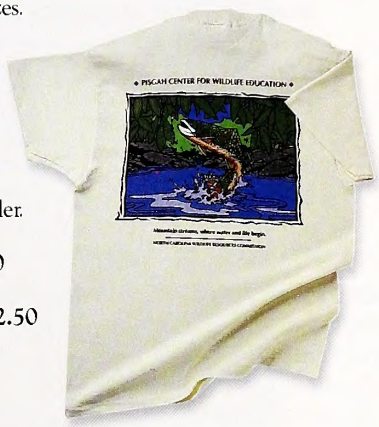

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Sporting Heritage T-shirt

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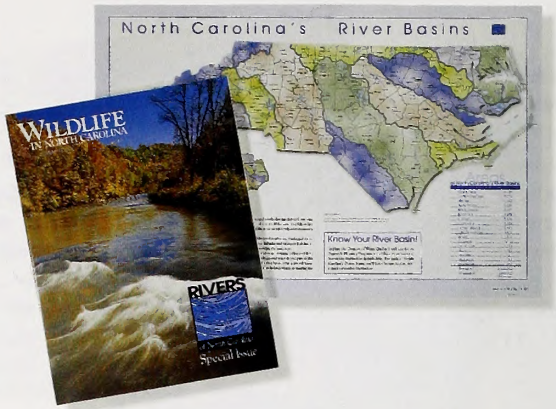

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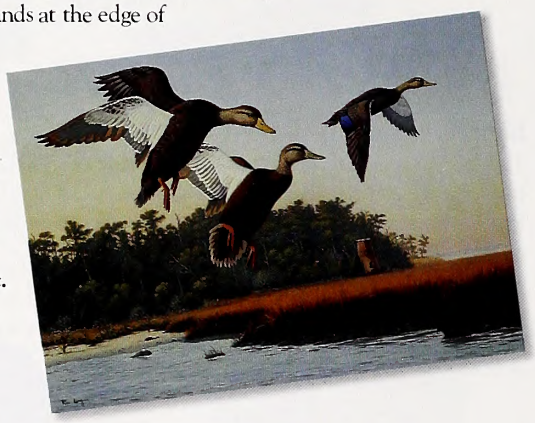

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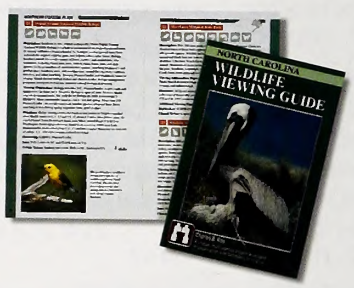

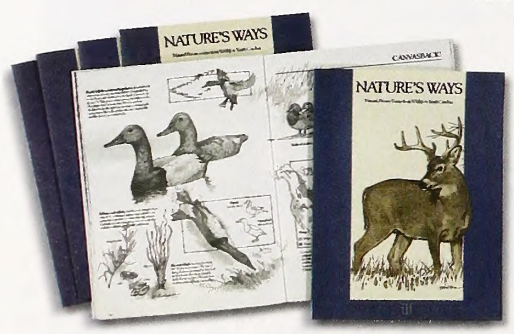

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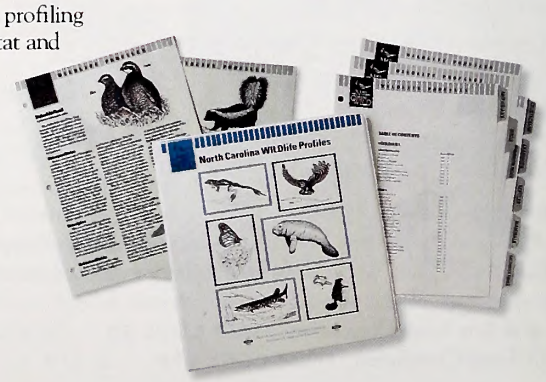

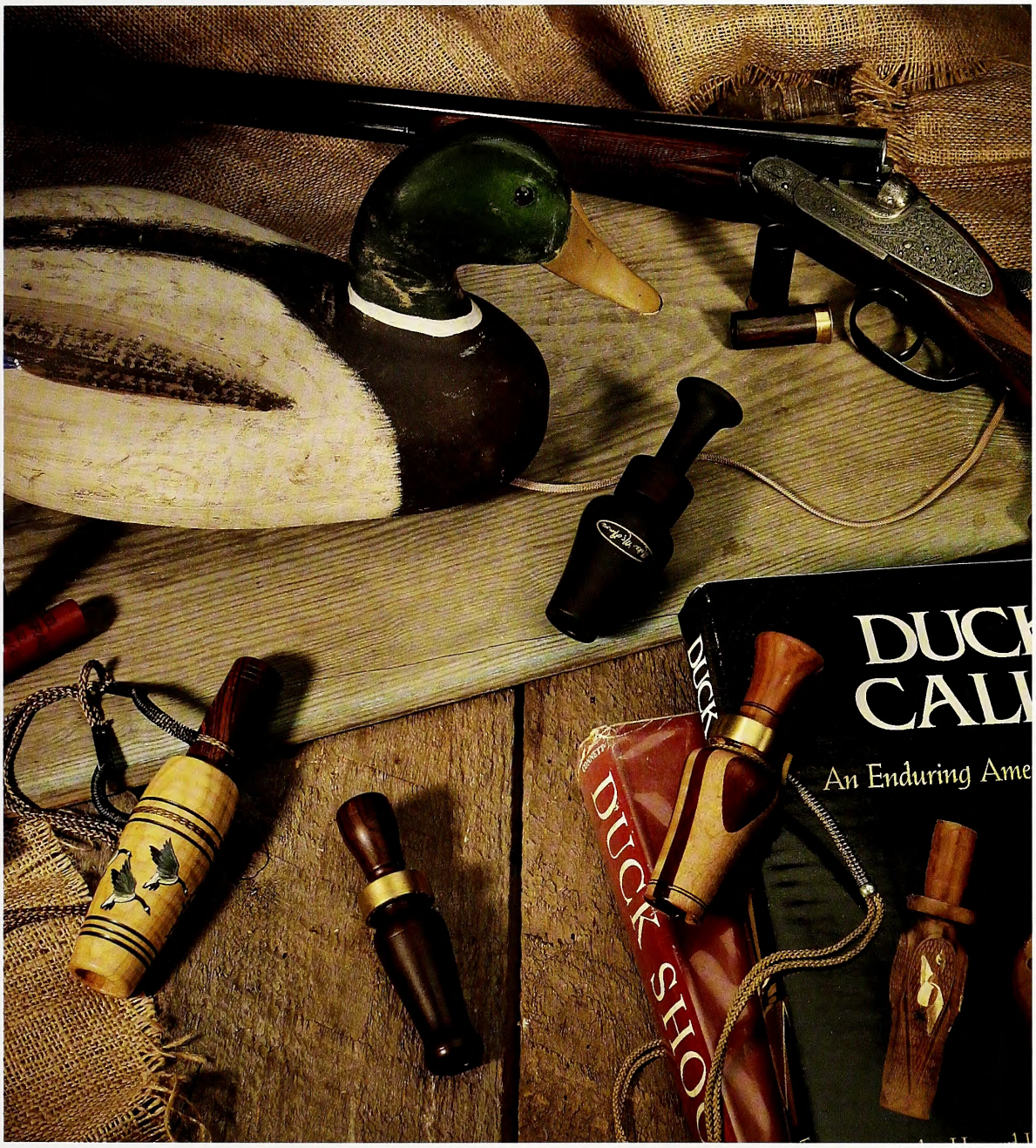

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Leaping Buck

A majestic white-tailed buck glides over a farm fence on a frosty mountain morning.

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WILDLIFE IN NORTH CAROLINA

DECEMBER 2001 $1.50

Only a Dream?

by Jim Dean

JIM DEAN

"He had that wry smile that was so familiar, a mirror of his gentle nature and self-deprecating humor."

It seemed so real, this dream. It was late afternoon, and I had been hunting quail with my father, brothers and son. I had let them walk ahead following the dogs across the field to the house. Despite the sullen sky, a strange quality of colorless light compelled me to linger. Ice lay in the frozen ridges of mud along the path, and there were patches of dirty snow in the fields. I turned and looked back across the sere fields to a distant tenant house and the dark woods beyond. An old man in hunting clothes and a worn, brown leather jacket was walking toward me. As he drew nearer, I recognized my grandfather, Will Dean. He had that wry smile that was so familiar, a mirror of his gentle nature and self-deprecating humor. But as I was about to rush up and give him a hug, he stopped a dozen feet away.

"I can't stay," he said, "I'm just here a few minutes."

"I'm headed to the house," I blurted. "Everyone is there. I know they would all love to see you."

He shook his head. "Not enough time, I'm afraid, but tell them I'm fine."

We talked briefly, and I told him how much I missed our times fishing and hunting together. There seemed to be an aura of sadness about him, as though whatever he'd found on the other side had not entirely compensated for what he'd left behind. And even as we talked, I was aware that he and the farm were growing more translucent. (Apparently I have no filter for clichés, even in my dreams.) Then, with a final smile and wave, he was gone.

I awoke with my pragmatic nature fighting the feeling that this had been a tangible visitation. He and I had always shared such a special friendship, and his unexpected death in 1968 had been devastating. I had also come to admire the grit so typical in those who, like him, are orphaned early and learn to shake life for every seed. He had worked his way through college and bought the first piece of this farm when he was only 24 years old.

I had just taken over the operation of the farm from my Dad when I had that dream, and I still think about it occasionally, most recently one afternoon this past fall. I had gone to the farm to work, and possibly fish a little. But thunderstorms rolled through from the west, and I sat for a long time in a rocker on the back porch of that same tenant house, a deteriorating derelict I'd fixed up to use as a retreat. Lingering rain pattered the tin roof, dimpling the pond out back, and fog began to obscure the fields and distant tobacco barns.

It occurred to me that it would please my grandfather to visit the farm and find that it looked much the same. And what a pleasure it would be to take him around and show him what had changed, too.

Certainly he would have loved the tenant house—no longer a windowless hulk covered with vines, but a wonderful rustic camp with porches, old furniture, wood stoves and oil lamps. Of course, he probably would have been more impressed with the new barns and especially the big greenhouse that had replaced the plant beds.

I also knew he'd approve of the 26 acres of wildlife Conservation Reserve Program land that had been planted especially for wildlife, and the small clearcuts and thinning operations that had improved both timber growth and habitat. He would also have loved the ponds, especially the renovations at the old pond and the big new one down in the woods waiting to fill with water so it could be stocked. But what would he have thought of all the deer tracks in the fields, or the 19 wild turkeys I'd seen feeding on grasshoppers in a field the previous year? There had been no turkeys here in the 1950s and '60s, nor any deer that we knew of.

He would surely have been happy to hear that Curtis and Louise were still operating the farm for us, and that both their daughters had graduated from college, had good jobs, gotten married and had children of their own.

I was getting ready to leave when an ashtray full of arrowheads caught my eye. They had been found in surrounding fields, and I believe Granddad would have said that they are reminders that we are only temporary stewards of any land, bridging the gap for those who follow.

The thought occurred to me that should I ever appear in some grandson's dream, I would want to see what followed me. I suppose, however, it would be asking too much to also get in a couple of hours of fishing.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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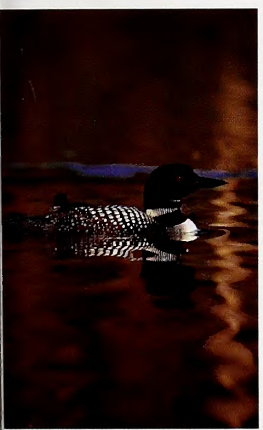

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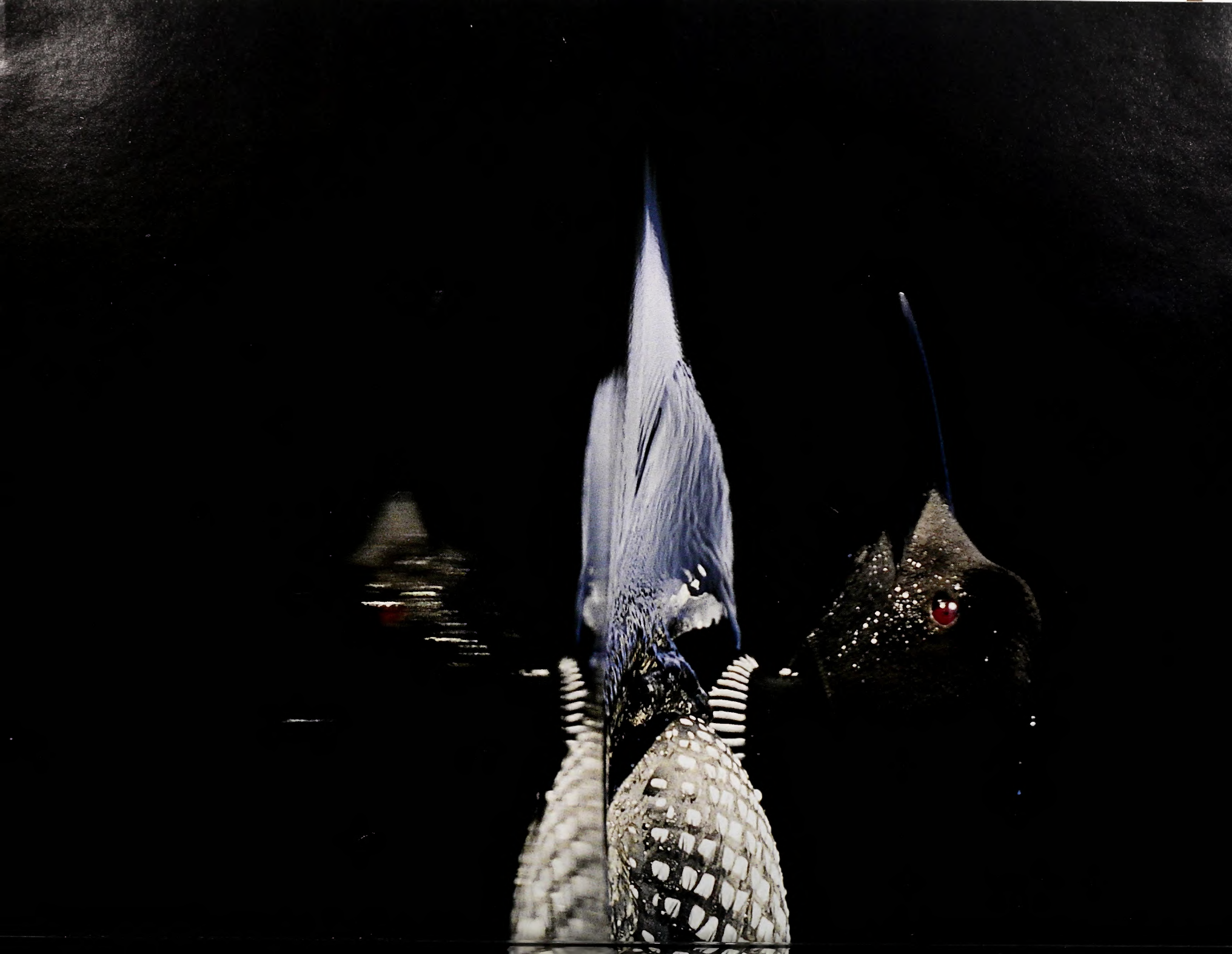
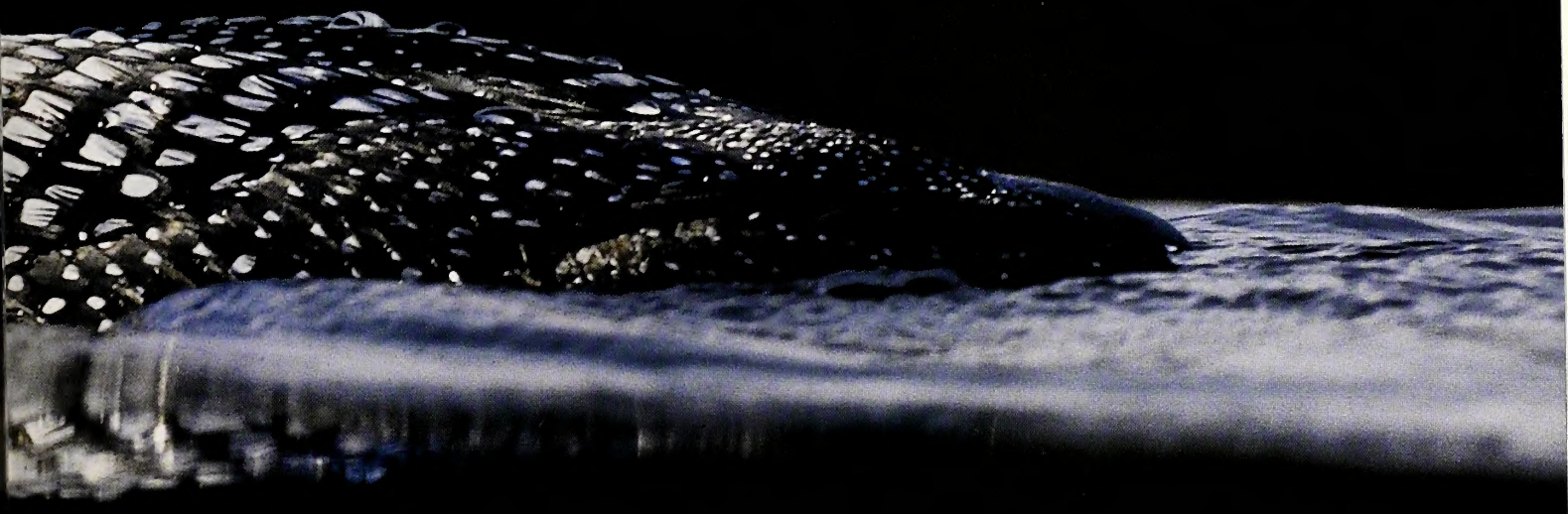
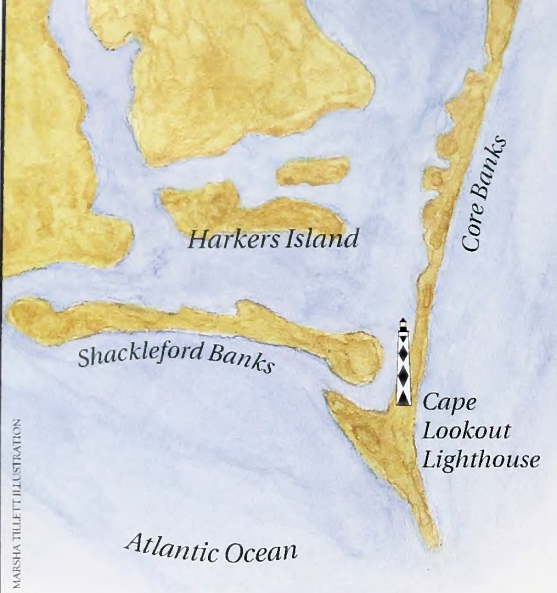


Nothing to **Laugh** *About*

Loons now face environmental threats even deadlier than old-style hunting.

written by David S. Lee *photographed by* Bill Silliker Jr.





MARSHA TILLETT ILLUSTRATION

Loons raise their young in the summer in northern freshwater lakes but winter primarily in the Atlantic Ocean from coastal North Carolina to Georgia.

The men were all good shots. Loon after loon folded and hit the beach or the surf's edge with sand-muffled thuds. There was, of course, the obligatory teasing for an occasional missed shot. It was good sport driven by the Harkers Islanders' fondness for eating greasy, fishy-tasting loons. Over time, the annual spring loon shoot on nearby Shackleford Banks became a local tradition. Though it represented what was probably one of the last vestiges of organized market gunning in this country, the hunt was also a social gathering. So despite the complete protection of loons by the Migratory Bird Act of 1918, for years the hunt itself remained a blatant family outing.

It was something the community looked forward to for as many years as anyone could remember and was as key to the local welcoming of spring as the return of swallows to Capistrano. School was even let out. Mothers and daughters prepared sandwiches and pies. Young children gathered up the fallen loons and piled them high, while fathers and sons dropped migrating loons till the barrels of their 12 gauges were too hot to hold.

Wildlife law enforcement agents were frustrated. The exact date of the early-May hunt varied from year to year and always remained a well-kept secret. Throughout the hunt, a person was always on watch for law officers approaching by boat from the mainland.

In 1950 the U.S. Fish and Wildlife Service placed an undercover agent in the community. Hired as a local schoolteacher, he became accepted by the residents in the months that followed. With inside information as to the day of the hunt, wildlife agents swarmed Shackleford Banks during the night before and waited for dawn. Thirty minutes into the hunt, state and federal wildlife officers emerged from their hiding spots in the dunes. More than 70 unsuspecting residents were rounded up, and nearly 250 dead loons were taken as evidence.

The raid effectively ended the mass exploitation of loons, a species that recovers slowly if at all from indiscriminate slaughter. Loons have a life span of 20 to 30 years or more. Like most long-lived animals, they have a modest reproductive rate—a mere 0.5 young successfully raised annually per mating pair—and a nonreproductive adolescence that typically lasts four years. Over time, natural mortality in the population is balanced by the longevity of the parents. The problem with this life-history strategy is that it works well only when conditions are relatively stable. A higher-than-normal mortality of adults in a single season could take decades to correct.

But the amount of actual damage done by the annual loon hunts was minor compared to the conservation problems common loons presently face. It's a double-barreled problem that hits loons both on their northern breeding lakes and in their marine wintering areas.

MADE FOR WATER

The loon's common name does not refer to the moon, or "luna," as one might suppose, nor is it based on the bird's lunatic-like (from "lunar") laughing vocalizations. The name arises from the Old Scandinavian "loom," meaning awkward or clumsy. The bird's awkwardness on land results from the placement of its legs far back on the body. Loons are the only birds whose legs are encased in their bodies down to the ankle joint. Their feet and flattened leg bones stick out behind like twin propellers. This makes them well adapted for swimming, but they're blundering clowns on land.

A story passed down by the Micmac Indians of eastern Canada tells of a time when loons lived on land. One was so tame that it had the run of the village. But it clumsily ran in and out of wigwams, knocking over belongings and spilling bowls of food and drink. When the people could stand it no longer, they caught the rascal and threatened to kill it. The loon thought quickly and begged its vindictive captors to throw him into the fire and not into the cold, deep lake. They were surprised to hear the loon laughing "just what I wanted, just what I wanted" as it swam away. (I wonder if Joel Chandler Harris knew of this legend when he wrote about Br'er Rabbit and the Brier Patch.)

Clear-water lakes and ponds are the summer home of the common loon. It is here that loons raise their young and sing their eerie, drawn-out call note—"ah-ooooooo-aah."

The cry is loud, rising in the middle and falling toward the end. Loons have a number of calls, yodels, laughs and wails that they use in courtship—vocalizations that fathered the expression "crazy as a loon." But it is the long, nocturnal cry of the loon and the ensuing silence that exemplify the peaceful spirit of the North Woods.

The common loon is one of five living species of loons, all members of a closely related, distinct order of diving birds confined to the Northern Hemisphere. They are made for swimming and diving at depths up to 240 feet. Loons can sink slowly under the water without leaving a ripple by expelling air from their lungs and from under their feathers. Their high specific gravity—an indicator of density and buoyancy—comes in part from solid, heavy bones, which are not hollow like those of chickens and other birds.

Loons also have special blood and body chemistry that makes them resistant to toxic carbon dioxide, allowing them to remain submerged for long periods. Half their day is spent swimming and diving for food—small fish mostly, although in rare instances they feast on fish up to 18 inches long. These larger meals are brought to the surface, but loons suck up smaller fish under water like a swimming-pool vacuum cleaner. Many common loons winter far out at sea.

Over the last 20 years, I have regularly spotted individuals and small groups of loons 20 to 35 miles from shore, in waters 100 to 3,000 feet deep. The birds would swim and dive to avoid the path of our boat. Sometimes they would remain submerged for 3 to 3½ minutes and reappear 40 to 50 yards or more from where they were previously seen. Studies on freshwater lakes show average diving times to be less than a minute. Out at sea, the birds were likely catching fish in the water column.

Ocean currents transport loons resting on the surface to oceanic fronts where currents converge. These zones are richer and more productive than random places the loons would pick for themselves. At these oceanic frontal boundaries, the loons forage more efficiently. A colleague of mine calculated the various densities of loons over the continental shelf of the southeastern United States. His figures indicated 200,000 loons wintering in the Atlantic between Cape Hatteras and Georgia. These large concentrations make the region one of the looniest places on earth.

HABITATS INVADED

Man's altering of habitats no longer allows for a wealth of ecological niches. Highly specialized species such as loons are the first to be affected because they depend on key seasonal habitats that are degrading simultaneously in different geographic regions.

On their summer lakes and ponds up North, loons face growing recreational pressures. People seeking wilderness experiences are drawn to the same remote, clear-water lakes and ponds that are the traditional nesting sites of the common loon. Disturbances at the site from camping, canoeing, family outings and weekend fishermen all take their toll. Many of the large lakes also support heavy motorboat traffic. To some extent, nesting loons become conditioned to the presence of people, but personal watercraft and nests are in most cases incompatible.

The problem is compounded by a sudden influx of vacationers around late May—the end of the school year, Memorial Day and in Canada the Victoria Day celebration. This is a crucial time for loons; adults have just started their nesting cycle and are most likely to desert their eggs if disturbed.

Oil spills present a real problem for loons. The birds are constantly in the water, and they react instinctively to an approaching problem—a boat or an oil slick—by diving. Even small amounts of oil on a loon's plumage are usually fatal. The oil-fouled feathers no longer provide adequate insulation, and loons will not climb ashore to dry out. They try to preen the oil from their feathers, and the oil and tars damage their digestive tracts.

JAMES PARNELL

Seasonal plumage differences are apparent in 8- to 10-week-old loons hatched in the summer in Maine (top) and in winter off the Carolina coast (bottom).

JAMES PARNELL

Both the common loon (chick, top) and the red-throated loon (bottom) are built for water, having legs that jut behind like a ship's rotors for powerful swimming. Unlike other birds, loons have dense bones, allowing underwater dives of up to 240 feet in search of fish.

On both the breeding and wintering grounds, loons frequently tangle in monofilament line and get caught in commercial fishing nets and traps. The number of loons accidentally caught and drowned will never be known. When I first came to the N.C. Museum of Natural Sciences in Raleigh, a Chowan River fisherman made me aware of this problem, and I thought that salvaging drowned loons would be a good way to increase the holdings of our scientific collection. I soon realized that fishermen were reluctant to save the dead birds. They feared that documenting the problem would result in additional regulations, which would have an economic impact on their livelihood.

Shoreline development causes more problems. Long-term owners of private cabins may be aware of the loon's need for privacy, but visitors to summer camps, resorts and commercial campgrounds usually are not. In addition to human disturbance, the filling-in of shorelines and building of retaining walls eliminate prime nesting habitat. Even in relatively undisturbed lakes, studies show that loon reproductive success decreases in areas near summer cottages. Development has the secondary effect of increasing, or at least concentrating, predators of loon eggs and chicks—crows, ravens, gulls and raccoons. They are attracted to human habitation because of garbage to scavenge and handouts from well-meaning summer visitors.

Acid rain is a problem on northern lakes. Where severe acidification has occurred, the lakes are dead. In those less severely hit, fish populations crash and the loons feed their young on newts and crayfish. The young grow well for the first two weeks but then weaken and die from lack of an adequate diet. On acidified lakes, the dive times of adults are longer, suggesting a greater time needed to find or capture food. Acid lakes also create chemical changes, increasing the release rate of mercury into the water, which allows an accelerated uptake through the food chain.

Like other long-lived aquatic birds living at the top of their food chains, loons accumulate environmental pollutants in their tissues. Winter loon die-offs are common along the southeastern coast; as many as 7,000 to 8,000 loons died on the Gulf Coast of Florida in 1983. The precise causes are often hard to pinpoint, but symptoms and tissue analysis point to mercury poisoning imported in the bird's own tissues from northern lakes. Mercury apparently affects the rods in the loons' eyes and decreases their ability to hunt. As the loons starve, additional industrial contaminants stored in their fat are released into tissues, compounding the problem. The loons eventually become so weakened that they can no longer hold up their heads, and they drown.

FLIGHT & FEATHERS

Each year, loons are totally incapable of flight for many weeks. Unlike most birds that molt their flight feathers a few at a time so that they are always able to fly, loons molt all of their primary and secondary wing feathers at the same time. This extreme adaptation for feather replacement stems from the loons' poor wing-loading ratios. Loons are heavy birds that are well adapted for their aquatic lifestyles, but even under the best of circumstances, they are poor fliers.

Loons have the least wing surface in proportion to their weight of any flying bird and have trouble getting airborne. On a number of occasions, folks have brought me loons that were found in shopping center parking lots and similar places. The birds had landed at night, mistakenly thinking they had found open water. These well-intentioned people logically believed the birds to be injured because they could not fly. Even with a complete complement of feathers, loons are incapable of taking off without a running start over water.

They splatter across the surface—half flying, half running—to take flight. Depending on wind conditions, this requires a runway of 25 yards to a quarter of a mile. The cure for the downed loons was simple. I took them to the nearest open body of water and turned 'em loose. The birds would swim from shore for a few yards and get a running start. The little extra lift from their momentum would be just enough to get airborne.

Molting loons, on the other hand, are incapable of flight with the loss of even a few wing feathers. So for them it is more advantageous to replace them all simultaneously. Since they cannot fly anyway, it is to their advantage simply to get through the molting business as efficiently as possible.

Not only do loons have an atypical style of molting, but they also time it differently than most birds. Because of where they live in the summer, it would be highly likely that a badly timed molt would leave them stranded on far-northern lakes, where cold nights would leave them icebound. Not that they would actually freeze in the ice, but they would be no more able to take flight from an ice-covered lake than they would from wet asphalt. Because of this, loons renew their flight feathers on their wintering grounds. To us it seems strange that these birds have evolved to be totally flightless when wintering at sea, sometimes far at sea, but really this is their best survival strategy. Don't think of them as helpless birds bobbing on the surface of the open, wintery ocean. Loons are powerful swimmers and quite at home in aquatic environments.

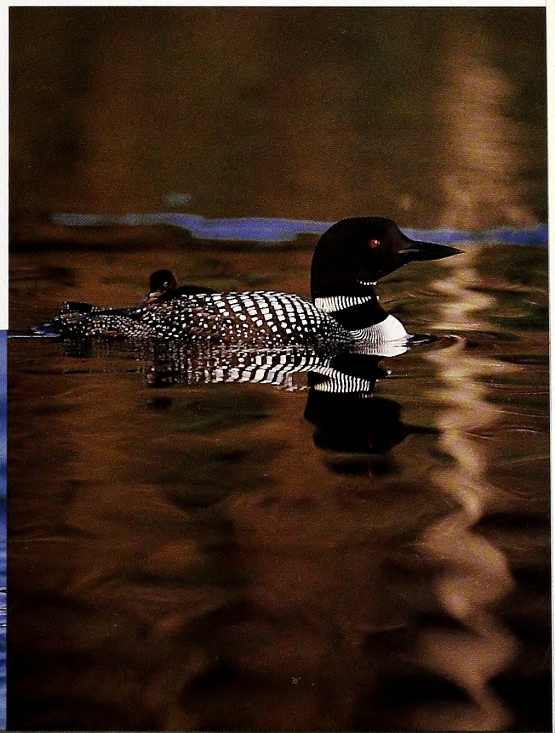
COME SPRINGTIME

As days grow longer, a loon's urge to propagate grows stronger. With feathers renewed and a winter of fueling up on abundant marine fishes, a loon's impulse to migrate northward for spring begins to stir.

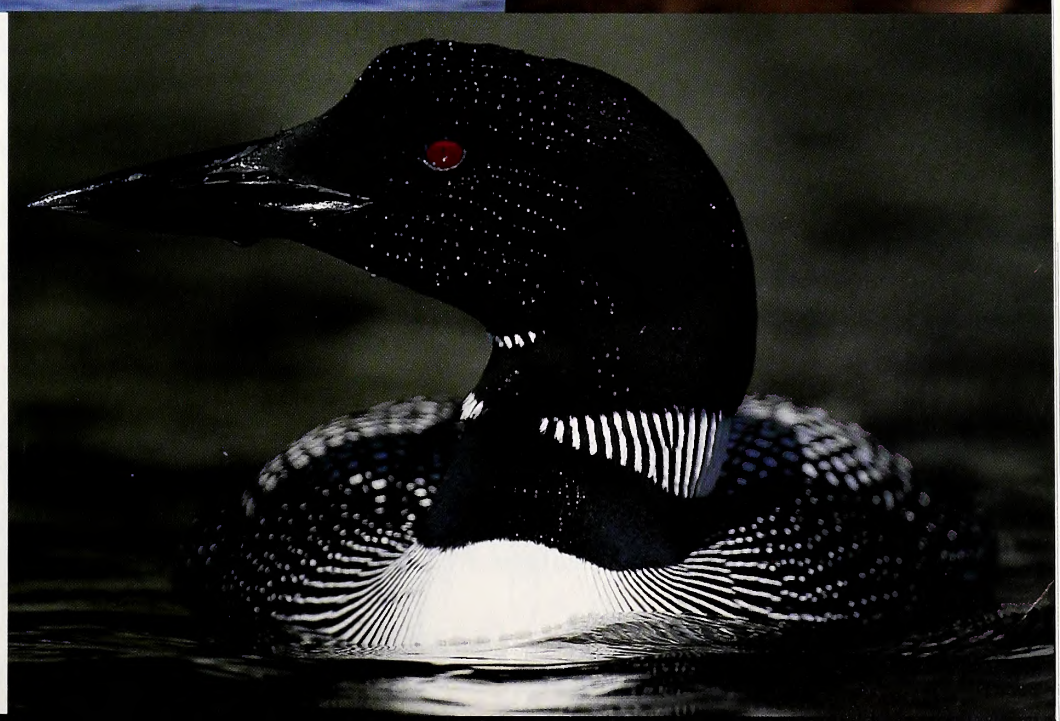
The late Harry Davis, former director of the N.C. Museum of Natural Sciences and a Buxton native, studied the spring loon migration pattern at Cape Lookout. He found that the loons migrated in from the south at night. Coming in over the sea, they became confused by the land jutting out to sea and splashed down. They sat on the ocean through the remainder of the night. But, at first light, when the birds could make out the land, they resumed their flight, with many of them short-cutting above Shackleford Banks. It was at this very point that they were intercepted annually by the islanders.

The Great Loon Shooters Roundup of 1950 was a clear victory for wildlife enforcement, certainly an event of more than minor benefit to loons and also the loss of a long-standing coastal tradition.

The islanders felt betrayed and were furious, but the counterfeit schoolteacher had packed his belongings and was long gone before the raid. There are many people still alive who recall the event, and many who participated as children still live on Harkers Island. Are they bitter and resentful of the laws forced on Down East ways by outsiders? Do they feel betrayed by agents pretending to be part of their community? You bet they do. But these are also people of strong tradition, and humor remains a valued part of the tradition. They still tell the story of the great raid. They never knew his real name, but the mock schoolteacher remains affectionately known to old-time Harkers Islanders as the Loon Ranger. ⊠



Colorful and highly vocal, the common loon is actually shy of humans. Development and recreation on northern lakes have deprived the birds of many prime nesting and brood-rearing habitat.



Tough Guys

written by Jim Mize
illustrated by Chris Armstrong

Hunting's familiar rituals help us deal with the tough times.

The fellows I hunt ducks with discuss nasty weather fronts like kids hoping school will be canceled.

"I figure the temperature will drop 20 degrees, and we'll get sleet."

"Probably. You can bank on whitecaps and a heavy chop, too."

"Want to go early?"

"Sure, we'll probably need the time to haul in some extra decoys."

My deer-hunting buddies up in the mountains are much the same, putting their stands on the north slopes of the Blue Ridge where moonshiners might have worked in earlier years and warmer months. The wind cuts through the ravines, causing the trees to groan from bending when it's too cold. These guys sit through it never budging, toes long since without feeling, fingers instinctively tucked under their armpits.

The cold, the short nights, the heavy loads and the long hauls play like fireplace tales from harder days. And to anyone who listened, we'd sound like a bunch of tough guys. Other times, though, tell the real story.

One of those was when my daughter was only months old. She had the usual ailments of infants, and this being my first child, my nature was always to try to fix them. Infants, however, don't come with repair manuals.

That first fall, she came down with something the local wives called the colic. She would eat, fall asleep and, as soon as she got cold, wake up screaming. Helplessness would cramp my stomach, and indecisiveness would paralyze me. I'd chase down her mom and watch her work her magic as if she had an instinct I didn't.

One night, though, while my daughter was frantic and I was alone with her, I tried a different approach. I'd been quail hunting and still had my chamois shirt on. Operating on the theory that babies and puppies calm down when warm, I undid the top two or three buttons and slipped her inside my shirt until just her head stuck out the top. Skin to skin, she lay against my chest the way I'd read of hypothermia being treated.

As she calmed down, I looked for a place to relax and moved to the hammock on the porch. Her tufts of blonde hair stood up, luminescent in the low light, and her wide eyes explored as we rocked. The fresh smell of life wafted up from her. I breathed deeply and held it as long as I could.

Far off, someone had released coonhounds for an early-winter run. They struck and came our way. As the lead hound yodeled in his country accent, my daughter and I turned simultaneously to stare, as if we could really see them.

A full moon rose through the pines behind our house, breaking free at last like a flash on a camera. The snapshot was of a night as close to perfect as I'll ever wish for—my daughter in my hunting shirt, coonhounds wailing closer and a poacher's moon lighting the way. And for a moment, I could solve all her problems, ease every hurt, provide for every need. I just wanted to stop right there.

I had no idea what the two of us would see down the road, and I wasn't sure I was ready. At the moment, I didn't feel too tough.

"And to anyone who listened, we'd sound like a bunch of tough guys. Other times, though, tell the real story."

Another time, years later, my 6-year-old son and I were up at first light. Excitement woke us long before the alarm went off. Dove season was about to open, and this would be my son's first trip to the dove field, even if it was as a spectator.

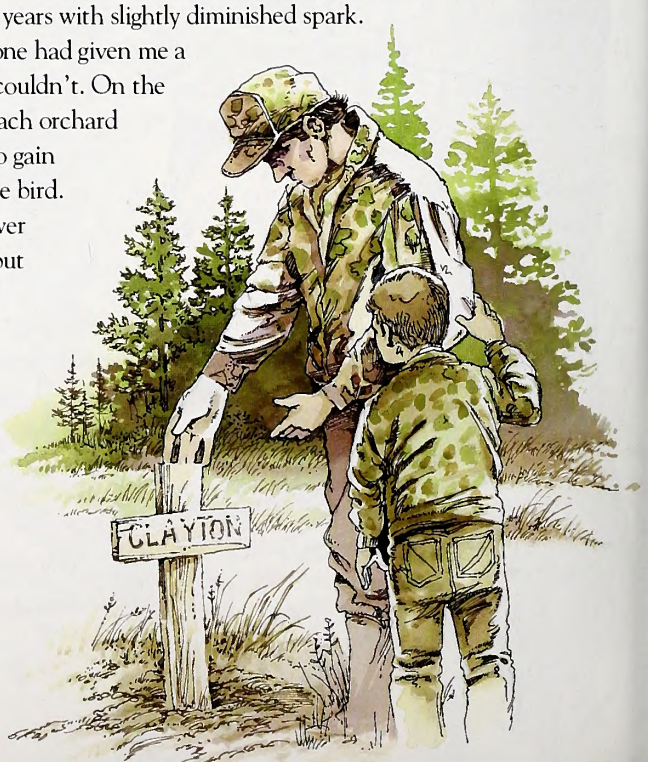
The part we anticipated most was seeing Clayton work. Clayton, my Brittany, had turned 11 that summer. His hide had more curl with age, and the pads on the back of his legs were calloused. Around his face, he wore his years with slightly diminished spark.

Most dogs will give a hunter days to remember, if they have the chance. This one had given me a few, pointing quail in kudzu I could hardly walk through, retrieving from briers I couldn't. On the dove field, he'd come under control in his later years. Once, in an abandoned peach orchard beside our field, he'd run down a cripple and taken it out of the air as it fought to gain altitude. Despite his age, his retrieves showed intense desire to come back with the bird.

I looked forward to my son seeing Clayton in action, even if it would be a slower version than I had known. After a hard hunt, Clayton would limp and struggle, but I figured he'd be up for a dove hunt.

Nothing could get me ready, however, for what I found that morning. Clayton lay against the fence, quiet and cold, dead in his sleep. I felt his head, rubbed the fur back, felt the cold that had settled in, smelled the dank stench of death. It smelled like a sweat gone cold after the struggle is over.

I looked away and sighed. Not just because I'd miss the dog. Sure, that was part of it. But I bit my lip to fight back the regret that my son would never hunt over this dog. We'd have no common memories of Clayton, no remembrances of him on point. My son would never see him bring a bird to hand, would never take a bird from his mouth. All I could feel was the loss, an emptiness where I would have kept anticipation.



My bird-hunting buddy had a way he'd learned to deal with death. He'd had the mixed fortune of outliving his peers, so his later years were burdened by funeral parlors and graveside services. Coming home from a service, he'd change clothes, turn loose his setters and do what he called "walking it off." He'd follow his setters over the hill behind his house and out of sight. We never knew if he did anything but walk. I could picture him, though, still tall with only a slight stoop from the years, briers scratching unnoticed across his britches as he walked and watched his dogs circle, remembering where he'd hunted before with his friends, including all the ones gone. I liked to think he was taking his memories for a walk, airing them on the hillside.

"I liked to think he was taking his memories for a walk, airing them on the hillside."

The time came, far too soon, when it was up to me to help lay this hunter to rest. This man had given so much—to me and to the friends who had gone before. But most of all, he'd taught me how to get through the hard parts.

After the last chorus of "Amazing Grace," the last condolence, I came home and changed clothes. Then I turned my bird dogs loose, and we relived all those hunts. The time we surprised a covey in the broomstraw. The day the big setter lay so low on point that we had to hunt him, finding him after a while, belly to the ground, in a gully where the birds held.

So many days and miles to walk off.

The years keep creeping up. My toes seemed colder in the duck blind this winter. My shoulders ache at night, and my knees pop. My buddies are about the same, and we joke about it. Still, we keep going into the icy darkness in anticipation of a morning hunt, cold winds cutting tears in our eyes. We go not because we're tough guys. We go because to us, these aren't the tough parts. They just help us deal with the tough parts. ⊠

SCOTT TAYLOR

TUNA ONLINE

WRITTEN BY CHRIS POWELL

Exciting new technology is unlocking the secrets of one of the ocean's more mysterious fish—the giant Atlantic bluefin tuna.

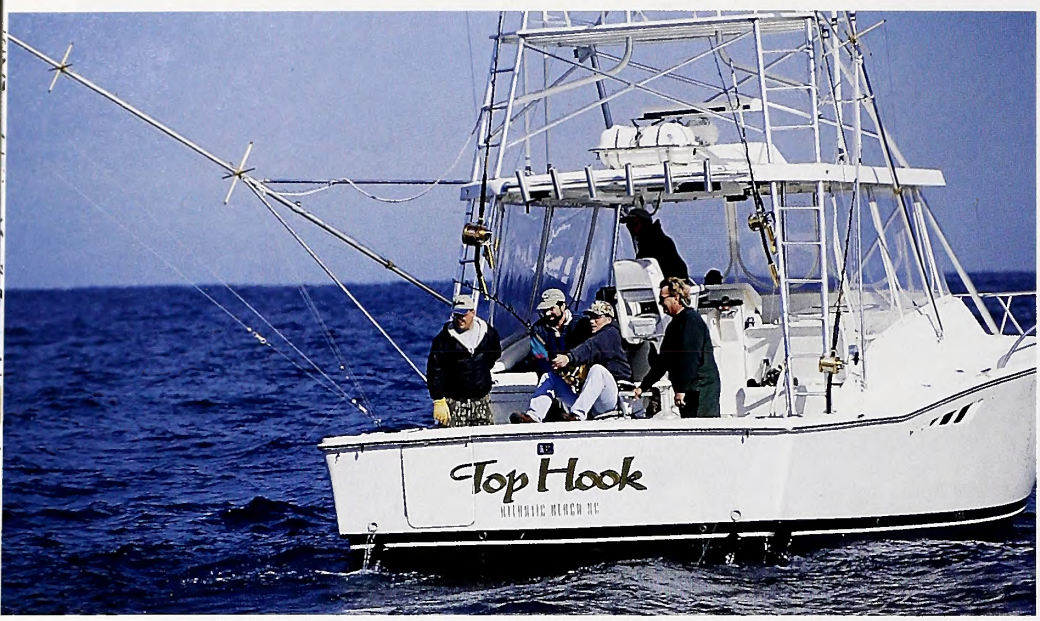
It's 4 a.m., and 12 miles off the North Carolina coast a school of giant Atlantic bluefin tuna slashes through 57 feet of murky water, annihilating a darting mass of menhaden. One particular tuna—caught and released 12 days earlier—carries with it a small black device attached near its dorsal fin. Part computer, part tracking device, the Pop-up Satellite Archival Tag knows that its free ride is coming to an end. On cue, the PSAT releases itself from the fish, floats to the surface and announces to the heavens that the tuna is right here.

"The fish are near the *Atlas* wreck," says Barbara Block, as she quickly helps her assistants load gear into the *Calcutta*, a 54-foot sportfishing boat. Expecting a PSAT transmission early that morning, Block was not disappointed. Most of the time it's a guess as to where the tuna might be. But this time Block, a Stanford University researcher, knows exactly. To the day and to the hour, the PSAT detached and began transmitting. Floating off our coast, the tag bounced a signal off an orbiting satellite, and the transmission proceeded as an e-mail message to the researcher's computer. Not only does the PSAT enable Block to pinpoint the exact location of the tagged tuna and its accompanying school, but it also allows her to download the entire travel route of the tuna during its tagged period. But for now, the important things are that the fish are nearby and that it's only a matter of getting to the spot to begin tagging more of these mysterious creatures.

Not an hour after leaving Beaufort Inlet, in less than 60 feet of water, the *Calcutta*'s mate, Junior Johnson, has ballyhoos trolling behind. Almost everything about bluefin tuna fishing runs contrary to traditional offshore fishing conditions. Most people associate deep-sea fishing with the distant, blue waters of the Gulf Stream and warm summer days. This time of year, however, giant tuna fishing is done near shore in relatively shallow water, when other fishing comes to a stop. The *Calcutta* and her crew are no different than any other Morehead City sportfishing boat, other than that they have been contracted by Block to serve as a tagging vessel for the Tag-A-Giant program. The program is a joint effort among Stanford University, the National Marine Fisheries Service and the Monterey Bay Aquarium to learn as much as possible about the travel patterns of giant Atlantic bluefin tuna.

The huge brass reel screams, and Shana Beemer, a Stanford University doctoral candidate, practically dives into the fighting chair. The ballyhoo, skirted with a pink Hawaiian

***Researchers measure** and tag a bluefin tuna off the North Carolina coast before releasing it to learn more about these massive fish.*



SCOTT TAYLOR

Since their discovery *off the Carolina coast in the early 1990s, giant Atlantic bluefin tuna have sparked a worldwide interest from fishermen and scientists. Below, a mate leans out the back of a boat to insert a lip hook in a tuna's lower jaw before bringing the fish onboard for tagging.*

Eye, couldn't have been in the water 20 minutes when a 300-pound tuna decided breakfast was served. Shana is quickly locked into the rod and reel and then into the chair itself. These fish are powerful and can easily pull an angler right out of the boat. Known to grow 10 feet long and weigh as much as 1,500 pounds, giants have ripped out rod holders and even uprooted fighting chairs.

The fish begins making runs, and Mike Stokesbury, a doctoral candidate at Dalhousie University in Nova Scotia, Canada, stands behind the fighting chair, turning it toward the fish as it races right, then left. The angler must be kept directly in line with the fish because if the rod bends to the side, it could crack in half. All the while, Capt. John Jenkins works the throttles, running the fish down, then pivoting to keep the tuna behind the boat.

It's all a team effort, and time is of the utmost importance. If the fish is allowed to fight for too long, the exhaustion could kill it. So the crew of the *Calcutta* uses a special 200-pound-test Dacron fishing line that has very little stretch. By applying steady pressure, they tire the fish quickly. Also, the tuna can be reeled in surprisingly easily (even by an average-build person like Shana) because it can't dive deep in only 50 feet of water. With the same fish hooked in 1,000 fathoms of water, the fight would last hours, and the end would most likely be death.

In 15 minutes the tuna is up, and Stokesbury slides himself through the marlin door, holding a lip hook with a rope attached. Once the tuna is hooked under its chin, it is pulled up a special ramp mounted to the stern of the boat, then slid onto a wet mat in the cockpit. Immediately, the fish's topside eye is covered with a chamois cloth soaked in water and fish slime; a hose is used to pump seawater into the tuna's mouth to hydrate and oxygenate its gills. Those two actions calm the fish, and the researchers proceed through a speedy routine. All hardware is removed from its mouth, and Barbara and Shana measure the girth of the tuna as well as its length from the jaw to the fork of its tail. A Floy tag (which indicates the date the fish was caught) is placed on one side of the dorsal fin, and if the fish measures 73 inches or longer, a PSAT is attached on the other side. Finally, a tiny portion of its fin is clipped for a DNA sample, and the fish is turned and slid down the ramp to freedom. All of this happens in less than two minutes.

The tagged tuna returns to a school of fish that are relative newcomers to North Carolina's coast. Giants were first found by Hatteras watermen around the beginning of the 1990s, and experts aren't sure exactly why the huge fish began arriving here. Bob Eakes, who has fished the waters off Hatteras all his life, said he is almost certain that the tuna were not present during the 1980s. A decade later, however, they arrived in big numbers and in big sizes.

"I think we had more fish back then," said Eakes, who sits on a tuna advisory committee for the International Commission for the Conservation of Atlantic Tunas (ICCAT). "Back then, we could chunk them up, and then target a big one. The fishery wound down some this year, and it was more a trolling fishery, so you couldn't really control the size of fish you caught."

Block believes the tuna have begun frequenting our coast because of menhaden—a small, oily fish that is a favorite food source. The overfishing of the tuna's food sources in other parts of the ocean may have forced the tuna to feed in areas along North Carolina's coast. Menhaden prefer our coast due to the convergence of the Gulf Stream and Labrador Current. The shape of the coastline creates a mixing zone around Cape

SCOTT TAYLOR

Hatteras, Cape Lookout and Cape Fear. "Most of the tuna have menhaden in their stomachs, although there are often other things—a few swimming crabs and pinfish. But the number-one item is menhaden," Block said. "So we have a big fast-food chain off the North Carolina coastline, and we've got a lot of bluefin tuna stopping in. We are learning that fish from the other side of the Atlantic are stopping in, too."

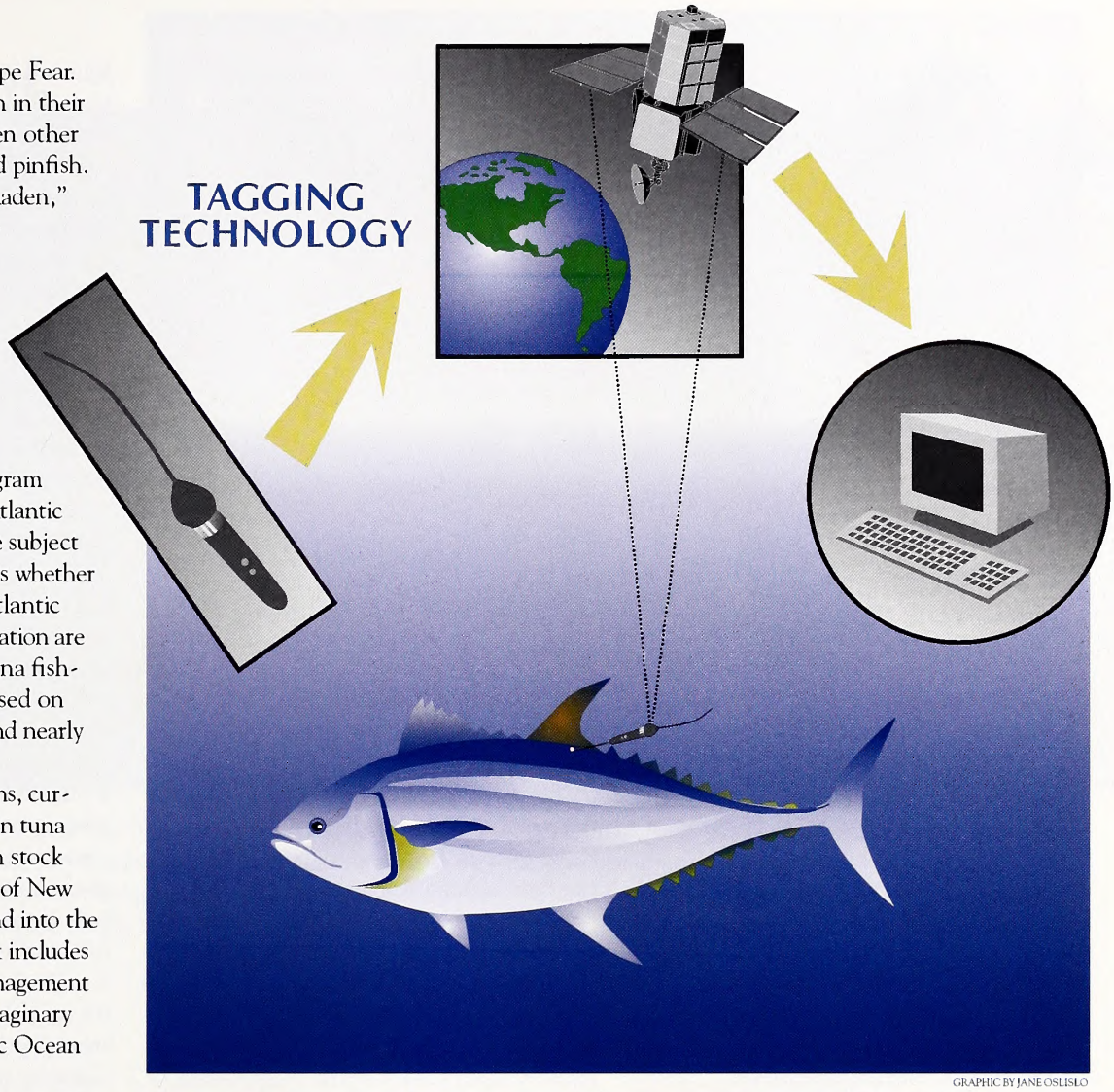
Researchers hope the data obtained through the tagging program will reveal the travel patterns of Atlantic bluefin tuna, which have been the subject of much debate. Also in question is whether there are one or two stocks of Atlantic giants. These two pieces of information are considered vital to manage the tuna fishery, which is believed to be collapsed on the western side of the Atlantic and nearly so on the eastern side.

ICCAT, a coalition of 25 nations, currently manages the Atlantic bluefin tuna fishery as two stocks. The western stock includes tuna found off the coast of New England down to the Carolinas and into the Gulf of Mexico. The eastern stock includes primarily the Mediterranean. Management of the stocks is separated by an imaginary line that runs through the Atlantic Ocean at 45 degrees longitude.

"So here is the problem," Block said. "You have the western side of the ocean doing a lot of conservation, taking a financial loss, because U.S. management indicates that if we conserve bluefin tuna unilaterally, we can bring them back. Then you have the eastern [European] side of the ocean taking as many bluefin as possible."

U.S. commercial fishermen have expressed concern over the possibility that the western stock mixes freely with the eastern stock, which would mean that conservation efforts on this side of the ocean would lead to larger tuna catches on the European side of the Atlantic. The giants are highly prized by commercial fishermen because a single fish can sell for thousands of dollars.

"In 1994, there was a very large meeting of scientists to look at this issue, and their suggestion was that there was not enough information in all the basic parameters of bluefin tuna," Block said. "We don't know how much mixing is occurring between the two stocks. We don't know if the two-stock theory is the best way to manage the fish, and we need to find the answer quickly, as recent catches of bluefin tuna in the east Atlantic and the Mediterranean are at new historical highs."



GRAPHIC BY JANE OSLISLO

Once a tuna is caught, *a Pop-up Satellite Archival Tag (PSAT) is attached near the tuna's dorsal fin, and the fish is released. The tag records the tuna's position every two minutes for up to a year. At a preprogrammed time, the tag detaches itself, floats to the surface then uses cellular-phone technology to send the data up to a satellite. The information is then sent as an e-mail to a researcher's computer. Biologists can use the recorded positions to tell precisely where the tuna traveled during its tagged period.*

Which is why Block and her team of researchers are so interested in the travel patterns of the giants that winter off the North Carolina coast. So far, they have tagged 500 tuna, and their goal is to place a total of 600 electronic tags by the end of the 2002 tuna season. Developed by engineers working with Block, the PSAT tag is truly a marvel of modern science. Until recently, scientists could only place a tag and wait for the fish to be caught before obtaining a rough idea of where it traveled. The archival tags, however, enable biologists to track a fish's movements on a daily basis.

"The trick that we are using is that the archival tags measure sunrise and sunset with a very sensitive light sensor," Block said. "The tags record depth with a pressure sensor, so we can correct for the amount of light gathered at varying depths. And before you know it, we can generate times of sunrise and sunset. Anybody who's a mariner knows that if you can tell your dawn and your dusk, and if you can determine your local noon, you can figure out longitude. And then day length gives you latitude. That's the breakthrough with these tags."

So while the tag rides the tuna, it constantly collects these data, storing them in a microchip. Then, at a time preprogrammed into the PSAT's computer (a researcher's

RODNEY FOUSHEE

A group of anglers *hold a bluefin taken after a day of fishing off Cape Hatteras. If annual quotas permit, a limited number of giants may be harvested off North Carolina's coast.*

Barbara Block, *a Stanford University marine biologist, works through the predawn light collecting data from a giant bluefin before it is tagged and released.*

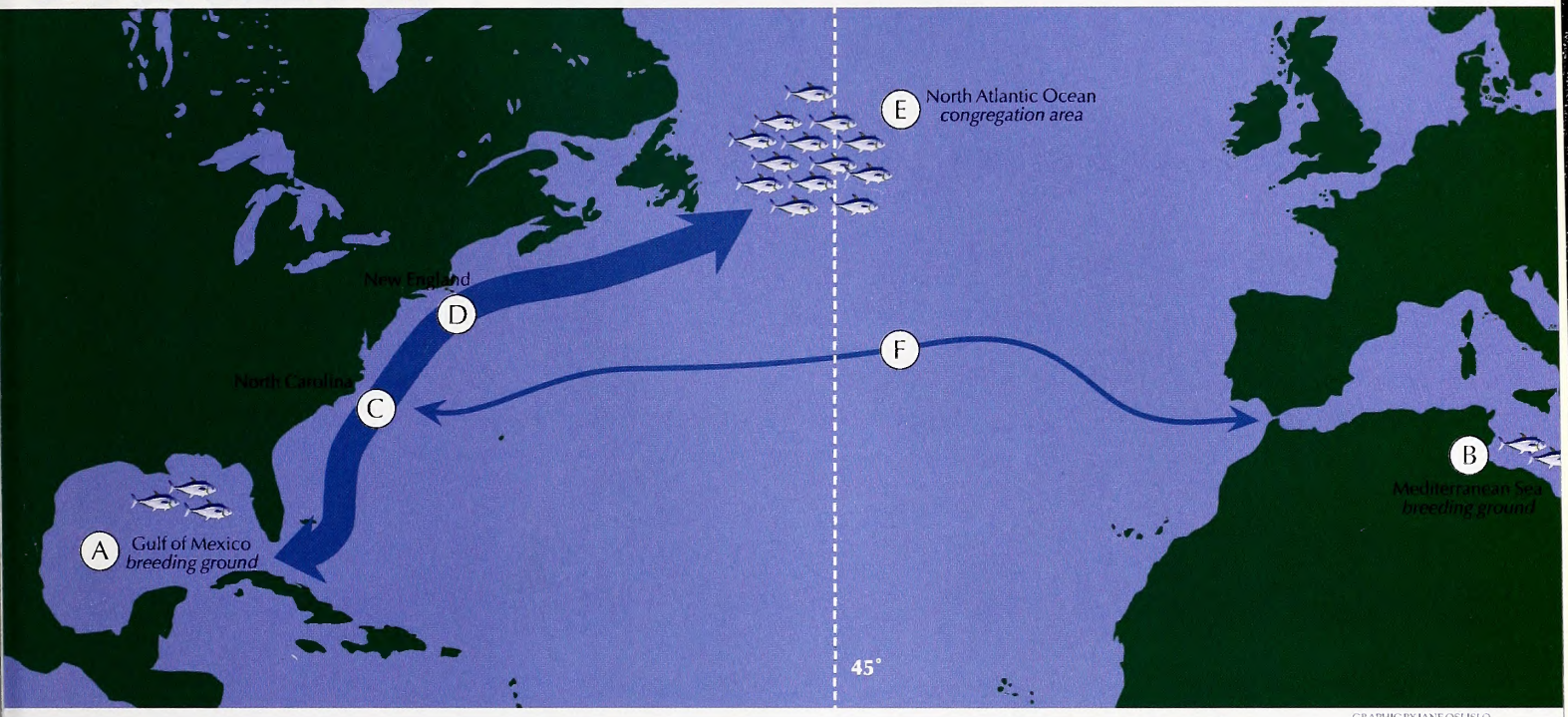
birthday, the morning of a tagging trip), the device activates a small battery, and an electric current is sent to a thin piece of metal holding the tag to the fish. Combined with the salt water, the electricity quickly corrodes the metal within a half hour, allowing the PSAT to break free, float to the surface and transmit its data using technology similar to a cellular phone. The pop-up tags can stay on a tuna for only about a year. But researchers also use surgically implanted archival tags that can record data for up to five years while riding safely inside the tuna. The computer remains implanted in the fish, with a small light and pressure sensor extruding from the body. These devices are usually recovered from commercial fishermen and fish processors, who receive a $1,000 reward for each returned unit. Thus far, 49 of the 279 tags implanted in fish off the Carolina coast in 1997 and 2000 have been recovered.

One of the first things scientists learned using the new technology was that giants released after being reeled in with heavy tackle were not dying as a result. In 1997, when scientists first used pop-up tags, 97 percent of the tags placed on tuna transmitted successfully. "A lot of people are arguing against catching and releasing giant tuna because they think the fish are dying later," Block said. "If you use heavy tackle—we fish with 150- to 200-pound test, and we use 280- to 300-pound test leader—and you use circle hooks, I will guarantee 95 to 100 percent of the time the survival of that tuna."

Scientists have also learned that there is a direct link between the Carolina and Mediterranean fisheries. On Jan. 21, 1999, a tuna was tagged off the North Carolina coast. It was caught by a Japanese longliner in the North Atlantic. A Canadian fish processor recovered the tag and sent it to Block. "When we downloaded the tag, the story that unfolded was pretty remarkable," Block said. "This fish stayed in the Carolinas until March 16, 1999. Then on

CHRIS POWELL

TUNA ON THE MOVE



GRAPHIC BY JANE OSLISLO

Using new tagging technology, *researchers have been able to accurately document the travel patterns of giant Atlantic bluefin tuna tagged off our coast. Marine biologists now believe there are two breeding populations of bluefin tuna in the Atlantic—one using the Gulf of Mexico (A) and another the Mediterranean Sea (B). Researchers have also learned that many tuna spend a considerable amount of time off North Carolina (C) and New England (D), before returning to their grounds in the North Atlantic Ocean (E). Some tuna cross the Atlantic (F) amd mix with giants in the Mediterranean.*

March 17 it headed offshore and went all the way to the mid-Atlantic, right where the 45-degree longitude line is. It went across the line back and forth 10 times, clearly showing that the fish move through the boundary zone. And then it headed back into the eastern Atlantic again and spent the entire next season there. It was finally caught about 300 miles south of Iceland. We have seven tags with a similar story on them."

Researchers have also tagged a bluefin off the Carolinas that swam up to southern New England, then down to the Gulf of Mexico, then back toward New England. Using implanted archival tags, two young tuna were tracked for 3½ years. One tuna traveled back and forth between New England and the Carolinas for the first three years, then went to the Gulf of Mexico in the fourth year, presumably to breed. The other tuna did exactly the same thing but went to the Mediterranean, also presumably to breed. These particular tuna are believed to have traveled between feeding destinations while they aged to the point that they were ready to breed. The hardest concept for people to grasp, Block said, is that there is one Atlantic bluefin species, but there are at least two breeding populations—one that breeds in the Mediterranean and one that breeds in the Gulf of Mexico. Researchers believe there are two breeding populations also because most bluefin in the Mediterranean breed by age 5, whereas giants in the Gulf of Mexico breed by age 8.

But further complicating the matter is the mixing between the two populations. Warm-blooded like a mammal, a tuna generates a hot body temperature, which translates into powerful muscles. These giants use this trait to travel extremely long distances in short amounts of time and with little effort. An average bluefin can cross the Atlantic basin in about 50 days. So for researchers, the idea that a fish with such amazing capabilities would range only through half the ocean seems doubtful. Many biologists are starting to believe that, though there are at least two populations, these tuna commingle regularly in the northern Atlantic. And because of that, Block believes the stocks must be managed as one in that part of the ocean to maintain a viable fishery.

"I personally am concerned about the level of overfishing, particularly on the European side of this fishery," Block said. "Given that this magnificent fish—the giant bluefin tuna—has been intertwined with human history for 4,000 years, it would be a shame to lose it on our watch." ⊠

TAG-A-GIANT

The Tag-A-Giant program allows anglers to assist researchers in collecting data on bluefin tuna while enjoying the excitement of tag-and-release fishing. To participate or learn more about the program, visit **www.tunaresearch.org** or call (831) 655-6239.

A Southern Tradition

Hunting squirrels with dogs dates back to Colonial times.
With the right dog, you can continue this rich tradition.

A good squirrel-hunting *dog must have a keen nose, the ability to track and silently trail bushytails, as well as the skill to follow them visually as the squirrels leap from one tree to the next. An exceptional dog is even willing to climb trees in pursuit of the quarry!*

written by Jim Casada
photographed by F. Eugene Hester

There was a time, in the not-too-distant past, when squirrel hunting was North Carolina's most popular shooting sport. And if one looks even further back into the state and region's history—to a time when the lordly chestnut still reigned supreme in the Piedmont and Appalachian high country—one will discover that the quest for bushytails was more than mere sport. Squirrel hunting meant meat on many a frontier table and a practical, productive means of honing shooting eyes to razor-sharp keenness. The Over the Mountain Boys, who played such a vital role in Revolutionary War victories at Kings Mountain and elsewhere, learned both their woodsmanship and marksmanship while squirrel hunting.

In those long-vanished days, most serious squirrel hunting was done with a dog. Indeed, a capable squirrel dog that would trail silently until it treed, then bark to let its human companions know its whereabouts, was considered a prized possession. Most frontier households possessed such an animal, and even a couple of generations back, squirrel dogs were relatively commonplace.

Unlike the situation associated with bird dogs, breeding never loomed large in the making of good squirrel dogs. Often, in fact, the less asked about their ancestry the better. There were, however, certain traits that then, as now, proved essential to the making of a good squirrel dog. A keen nose, the ability to track squirrels and silent trailing are desirable characteristics. Added to that list are the ability to follow the treetop tricksters visually as they leap from one tree to another, eagerness to catch and dispatch a wounded squirrel promptly if it falls to the ground and having what a bird-dog handler would describe as a "soft mouth."

These abilities can be learned, but instinct and natural talent are a big help. For the most part, squirrel-dog bloodlines seem to fall into one of three general categories, or crosses thereof. These are feist, mountain cur and what my grandfather used to refer to as a "general-purpose yard dog." Any of these has the potential, with proper training and encouragement, to make a first-rate tree dog on squirrels.

Today, it seems, decent squirrel dogs are about as scarce as the proverbial hen's teeth. Anyone fortunate enough to possess such a jewel should cherish it for all the inestimable worth we associate with the finest of canine companions. It is heartening to note that in some sections of the state, there is a revival of interest in good squirrel dogs. With that in mind, let's turn from our brief glimpse into squirrel hunting's past, along with our peek at the characteristics of good squirrel dogs, to the abundant joys of the sport itself.

***Squirrel hunting with** a dog is best accomplished with a pair of hunters, so that each partner can keep an eye out for fleeing squirrels on different sides of the tree that the dog has marked.*

Perhaps the first point to be made is that squirrel hunting with a dog is best done after heavy frosts have brought leaves tumbling to the forest floor. A dog can work just about as effectively early in the season, but locating a squirrel when trees are still in full foliage is quite difficult.

Once fall has edged into winter though, with hardwood forests clean and bare, bushytails are much easier to sight. And once deer season ends, chances are pretty good that you will have the woods to yourself. A lone hunter and his dog can work together in a reasonably effective fashion, but the sport is really a two-man game. That way, a hunter can be positioned on either side of the tree when game has been treed, to keep the squirrel from constantly scurrying out of sight.

Another advantage of hunting in pairs is that each hunter can carry a different type of weapon. One can tote a .22 for the precise accuracy demanded when you can see only a tiny bit of a target. The other hunter should be equipped with a shotgun to handle shots when squirrels are running or leaping from limb to limb. Of course, this also suggests that the sportsman who does hunt solely with a dog might be well advised to consider a shotgun-rifle over-and-under, such as the inexpensive but accurate little Savage .22/20- gauge combination I cherished as a kid.

Those who go after squirrels with a dog can keep banker's hours. It is best to give bushytails an hour or so in the morning to be out and about, leaving plenty of scent trails. Accordingly, there is no reason to get up at daylight and be situated at a likely spot in the woods at first light the way you would be when still-hunting. Once in the woods, however, you can generally hunt right through the day. With fewer hours of daylight and colder temperatures requiring that they consume additional food for energy, squirrels tend to feed right through the day late in the season.

There are several ways of approaching the hunt once you take to the woods. The old-time standard (and it was the approach commonly employed in the mountains where I grew up) was to walk along ridgelines to let the dog work its wonders. You can cover a great deal of terrain in the course of a half-day's hunt doing this, and that should be plenty of time to limit out, if squirrels are abundant.

That consideration, it might be noted, is one of the more practical sides of squirrel hunting with a dog. If it is meat on the table you are after, this is unquestionably the way to go. Still-hunting or sneaking will improve your woodsmanship and can be a lot of fun, but a dog adds greatly to the likelihood of a bulging game bag at hunt's end.

If you do not have access to large expanses of contiguous woodland such as that found in national forests, there are other options. One is to hunt small woodlots, fence rows and the like. Often, you can get an initial idea of whether or not squirrels are present by looking for nests, although their absence does not necessarily indicate the absence of bushytails. With a dog, though, patches of a few acres can be covered in a span of just 10 or 15 minutes.

One of the easiest ways to hunt squirrels with a dog is to walk along old logging roads or trails, with the dog ranging through the woods until it picks up a scent trail. Usually it won't be long until you hear it bark, signifying a squirrel has been treed. Even easier—true lazy man's hunting, if you will—was the example of woodland wizardry I once saw displayed by a squirrel dog in the heart of mountainous Graham County.

I joined the owner in a pickup truck as we slowly cruised back roads in the Nantahala National Forest. His mountain cur was

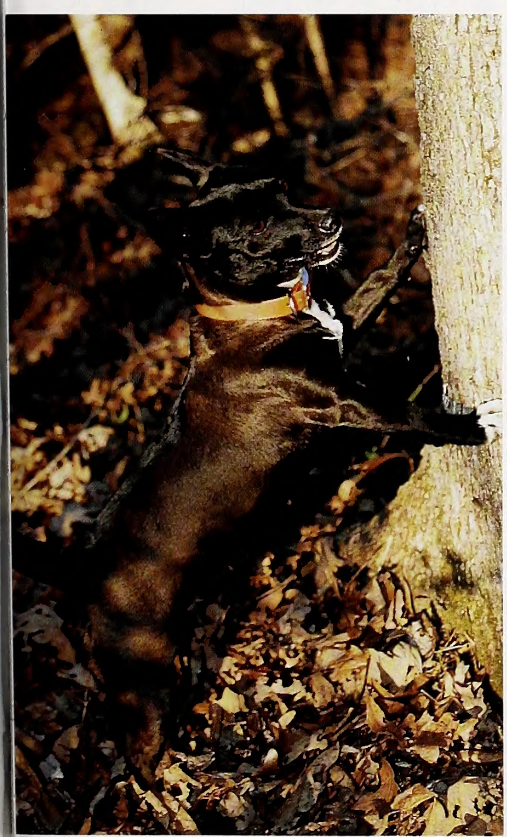
perched in the back, nose eagerly sampling the scents drifting through the cool, damp air. When the dog winded a squirrel, it would bark once and jump from the truck. Usually, it was only moments until we had stopped and "lit a shuck" to where the dog was dancing the light fantastic, barking at every breath at the foot of a tree. I couldn't help but think that this was the squirrel hunter's equivalent of quail hunting on horseback or from a wagon.

Another useful ploy is to allow a dog to work along river bottoms or creek edges. Squirrels seem to favor such territory, perhaps because you can almost always count on a corridor of mature trees in such locations. Walking is usually comparatively easy along watercourses, although there is sometimes the problem of squirrels being treed in a location where a successful shot will tumble them into the water. Some squirrel dogs take to water like a Labrador retriever; others want no part of getting wet.

Of course, you won't get a squirrel, or even a shot, every time the dog trees. Bushytails will make for a hollow den tree or a nest if given an opportunity, and you can almost bet that is where one is headed if it refuses to hold tight when a dog starts barking. You can pretty well forget it if the bushytail reaches a hollow tree, and it is unethical to shoot into nests. Incidentally, it is in situations of this kind that the finest squirrel dogs prove their mettle. A first-rate dog can not only follow a squirrel as it jumps from one tree to the next, but can also recognize when the bushytail has holed up in a hollow tree, gone underground or left the tree. Similarly, a dog of this caliber will let you know when there is more than one squirrel in a tree. The dog will continue barking after a successful shot and persist in its excited capers about the tree, even though you see no squirrel.

The ability to locate a treed squirrel can be quite difficult. In that regard, a good pair of binoculars or at least a 4X scope on a rifle can be a real asset. In addition to any suspicious bulges on limbs, watch closely for movement. No matter how tight they may be frozen on a limb, squirrels have a difficult time keeping their tails completely still. Also, if you have two hunters and a highly excited dog moving around the tree's base, the squirrel usually will make enough of a move to reveal its whereabouts.

No matter what approach you take to hunting with a squirrel dog, once you find or train one that hunts effectively, you are the owner of a true treasure. There are few finer ways to spend a late-winter day than trekking through woodlands listening for a telltale bark. As you scramble to reach the place where the dog has treed, it is somehow comforting to know that your actions form a tangible link with a sporting tradition dating back to the first European settlers. To travel the roads leading to yesteryear's traditions, to see and savor fine dog work, is to know a simple yet exceptionally satisfying sport. ⊠

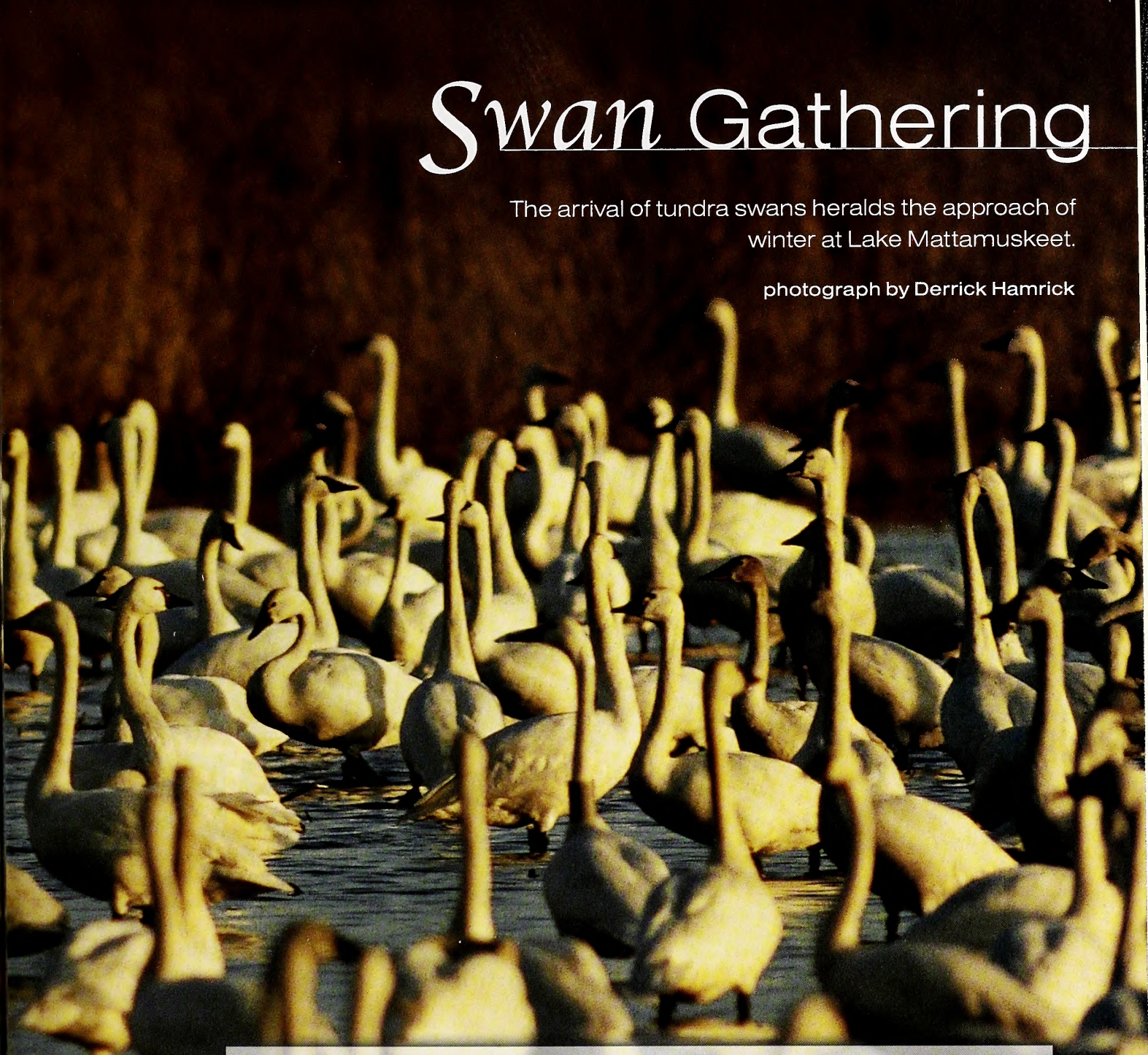


***An excellent dog can** not only follow a squirrel as it jumps from tree to tree, but can also recognize when a bushytail has holed up in a hollow tree.*

Swan Gathering

The arrival of tundra swans heralds the approach of winter at Lake Mattamuskeet.

photograph by Derrick Hamrick



They arrive by night—a seemingly endless stream of white bodies strung out over several miles in the crisp, late-November sky. Single flocks, as large as a thousand birds, make their final approach by the light of the full moon and drop in unison over the trees to land on the dark waters of the lake. The procession continues throughout the night as wave after massive wave of swans arrives. On the second night, even more flocks arrive. By the second dawn, some 20,000 to 30,000 tundra swans have gathered at Lake Mattamuskeet—part of the largest concentration of tundra swans in North America. The swans will remain here through the winter to feed and rest until March, when they depart for their distant breeding grounds in northern Canada and Alaska. ⊠

DENVER BRYAN

Southern Sleepers

written by H. Lea Lawrence

Often overlooked, woodcock and snipe provide challenging hunting opportunities for those willing to seek out these reclusive game birds.

It was the sort of situation in which I had reason to expect the unexpected. The Brittany was on point on the bank of a small stream, and though it was most likely she had nailed one of the singles from a covey of quail I'd put up earlier, the setting also spelled "woodcock."

What strengthened my hunch was that there was no cover directly in front of her, only a blanket of leaves, and I felt sure I already would have seen a bobwhite in such a barren setting. On the other hand, woodcock can melt into this kind of background so effectively that they become virtually invisible.

The question was quickly resolved. I stepped forward, and a brown blur erupted at my feet and began spiraling upward, emitting the telltale tinkling sound. I snapped the 20 gauge to my shoulder, and a charge of No. 8 shot ended the bird's ascent. It came tumbling down almost on top of the Brittany. I paused for a minute to admire it before placing it in the game pouch in my coat.

It was a nice bonus, and I decided to move along beside the creek to see if there might be more woodcock in the vicinity. If other birds were present or had been recently, I'd be able to spot their drill holes in the mud and the splashes

of white droppings. Looking for such signs is routine in the northern states, where the woodcock is a popular game species, but I was in the lowlands of North Carolina, where seeking them isn't traditional. Actually, not many hunters can even identify a woodcock, and most birds are taken incidentally during quail hunting.

This is not to say that there aren't some hunters who are knowledgeable and seek woodcock specifically, but these hunters prefer to maintain a low profile and not share their knowledge. Woodcock niches, like favorite fishing holes, are well-kept secrets. This is really a plus for those "in the know," because there's a lot of opportunity not only in North Carolina but in other southeastern states as well. Migrating woodcock pass through all of them on their way to their wintering grounds in the Gulf states. Biologists say that Louisiana winters 90 percent of the entire North American woodcock population.

A close look at a woodcock, or timberdoodle, makes it clear that it's a sort of "in-between" bird that looks a lot like a shorebird yet inhabits inland territory almost exclusively. And there's a difference in appearance. The woodcock is a squat, pear-shaped bird about the size of a softball, with short legs, a long bill and short tail. The tan and dark-brown colors on its back permit it to blend perfectly with dead leaves, and the undersides are rufous. The camouflage is so effective that the birds can seldom be spotted before they come bursting forth, with their wings making a tinkling sound. Their flight is erratic, almost batlike.

Earthworms are the principal item in the diet of the woodcock, which has a specialized tool for collecting them. The bill is long, with the upper half hinged halfway to the tip, allowing it to open underground and grasp the prey. Biologists have learned that a woodcock ingests more than its body weight in earthworms daily.

Because of its dietary needs, a woodcock prefers damp areas along creek banks, river bottoms and other marshy areas where the soil is soft and easy to probe and earthworms can be found in abundance. Frozen ground is the woodcock's nemesis, so the birds try to keep well ahead of frigid weather as they migrate, which is usually at night. Because of this, they are often here-today, gone-tomorrow birds.

H. LEA LAWRENCE

A bird dog can help *locate woodcock in heavy cover. The birds can be found in damp, wooded areas along creek banks.*

DENVER BRYAN

H. LEA LAWRENCE

"The woodcock isn't alone in the role of a southern 'sleeper.' The common snipe is just as overlooked by hunters, yet it offers some of the most challenging and exciting wing shooting."

Woodcock hunters are accustomed to the feast-or-famine aspect of the sport.

My streamside quest paid off in more ways than one. The Brittany's next point put up a timberdoodle, but subsequently she pointed two of the singles from the covey of bobwhites. I ended up with a nice mixed bag.

The woodcock isn't alone in the role of a southern "sleeper." The common snipe is just as overlooked by hunters, yet it offers some of the most challenging and exciting wing shooting to be found anywhere.

The common snipe, or Wilson's snipe, bears some resemblance to the woodcock and shares some, but not all, of its characteristics. The snipe is slimmer and more streamlined in appearance; yet it also feeds almost exclusively on earthworms, and has the same type of hinged bill that allows it to grasp worms and pull them out of the ground. While the kind of territory they inhabit is similar to that of woodcock, snipe prefer more watery spots, such as the edges of freshwater ponds and lakes, marshes and flooded fields and meadows. Like woodcock, they travel at night in flocks, then scatter upon arrival at a site and feed alone. Unlike their cousins, snipe are true shorebirds, members of a large and varied group classed as sandpipers. On the other hand, the two birds are alike in that they're virtually unknown to southern hunters. And for snipe, this applies to their entire range, which encompasses nearly all of North America.

This hasn't always been the case. In earlier days, the common snipe was one of the many shorebirds sought by both sport and commercial hunters, although it was not so favored as the yellowleg, plover, godwit and curlew. Hunting pressure eventually diminished the shorebird populations so severely that they were placed on the protected list. All but the snipe, that is; because these birds had never been heavily hunted and their numbers remained quite high, they were exempted.

Things haven't changed in that respect, and today they're still quite numerous. What's more, even though they're widely distributed in the United States and Canada, and most states and provinces allow them to be hunted, snipe attract very little attention. This is a missed opportunity for hunters because snipe are some of the most tricky and difficult targets a wing shooter can tackle. They're fast and totally unpredictable, capable of lightning aerial maneuvers.

One of the main differences between hunting the two species is that dogs generally perform well on woodcock but poorly on snipe. Also, many dogs seem to find something offensive about snipe and don't like to retrieve them. Some people think it's because of the scent, but others think the long bill creates the negative reaction.

What the birds have in common is that both are good to eat, and in this category it becomes apparent that the snipe's profile is even lower than that of the woodcock. Almost every wild-game cookbook contains four to six woodcock recipes, but often there's not a single snipe recipe included. That's OK, though, because practically any of the woodcock recipes will work, as will those for doves.

As for guns and shells, gauges are a matter of personal preference, mine being 28 or 20, but it's obvious that because neither bird is hard to bring down, low-brass loads of No. 7 or No. 8 are best.

The heaviest concentrations of woodcock and snipe occur in the coastal region, with the area around Lake Mattamuskeet being one of the most productive. Both species, however, can be found in relative abundance where the proper habitat exists throughout the Piedmont and on into the foothills of the Appalachians. Although by no means an everyday occurrence, I've put up woodcock in mountain valleys while hunting ruffed grouse.

Currently, North Carolina has a 30-day woodcock season in December and January, with a daily limit of three and a possession limit of six. The common snipe season is three months long, extending from November through February, with a daily limit of eight and a possession limit of 16.

So there it is: A pair of low-profile game birds that can add a lot of enjoyment to a hunting season, and provide some new and interesting challenges.

Why not give the "sleepers" a try? ⊠

DENVER BRYAN

***Woodcock have long** beaks they use to probe moist soil for earthworms. They migrate south to stay ahead of winter and frozen ground that would make it impossible for them to feed. Snipe (facing page, bottom) also have long beaks, but are slimmer in appearance.*

Imagine cold winds blowing and snow swirling. You can barely see in front of you as a storm rages and daylight fades. Trudging through deep snow, you hurry to reach the warmth and comfort of your home.

But what would you do if you were a squirrel, a mouse or a spider? Where can animals stay warm and safe?

Finding Shelter

written by Buffy Silverman / illustrated by Consie Powell
nature activity by Anne M. Runyon

HIDDEN IN THE BRUSH

When **predators** hunt, their **prey** hide. Many animals escape by scurrying under a thick bush or into a pile of **brush**. They blend into the branches that surround them and stay motionless. Brush piles also shelter animals during storms.

A cottontail rabbit stays hidden from its many predators by resting in a thicket for most of the day. At dusk it ventures out to eat clover and grass, always staying within a few hops of cover.

A white-tailed deer avoids being seen by standing as still as a statue. A buck presses its head to the ground so that its antlers look like the surrounding branches. A spotted fawn is perfectly camouflaged when it stands in a dense thicket.

A Carolina chickadee snuggles close to the trunk of a hickory tree.

Even a small hole in a tree will make a warm shelter for deer mice.

TREE HOUSES

Many animals seek shelter in hollowed-out trees. When a tree ages or dies, the **heartwood** starts to rot, leaving a hole inside the trunk. Dead branches also have hollow spaces that animals can enter. Inside a tree hole, animals are unseen by predators and safe in any weather.

Mammals as small as mice or as large as bears take refuge inside old trees. Some flee to the nearest tree cavity when a predator is near, then quickly leave to search for food. Others return to the same hole day after day. Opossums and squirrels bring leaves inside their tree holes to make a warm place for themselves or for their young.

Woodpeckers drill their own holes in dead or dying trees. Inside the hole they build **nests** of twigs, leaves and grasses. They lay their eggs and raise youngsters in the nest. Other birds, such as chickadees, Carolina wrens, kestrels and wood ducks, build their nests in holes that a woodpecker created.

In the winter, birds **roost** inside tree cavities. They do not build a nest, but find holes where they can sleep at night and escape storms. Some birds, such as white-breasted nuthatches, huddle together in groups to stay warm inside a tree hole. Others, such as Carolina chickadees, roost alone.

Tucked beneath a leaf, a spider is safe from raindrops as well as predatory eyes.

Leaf miners live inside white oak leaves.

UNDER BARK, INSIDE LEAVES

Trees shelter many animals in their branches, under bark and even inside leaves. Squirrels, woodchucks and other climbing animals race up a tree's trunk and wait safely on a branch while an animal hunts on the ground below. Moths resting on the bark of a tree are so well camouflaged that hungry birds do not see them. Spiders, ants and other insects crawl under bark to hide.

Insects called leaf miners hide inside tree leaves. Leaf-miner moths lay their eggs on leaves. When a caterpillar hatches, it tunnels inside a leaf like a worm crawling in soil. It eats the juicy middle of the leaf and stays hidden.

A brush pile is a cozy place for a cottontail to wait out a snowstorm.

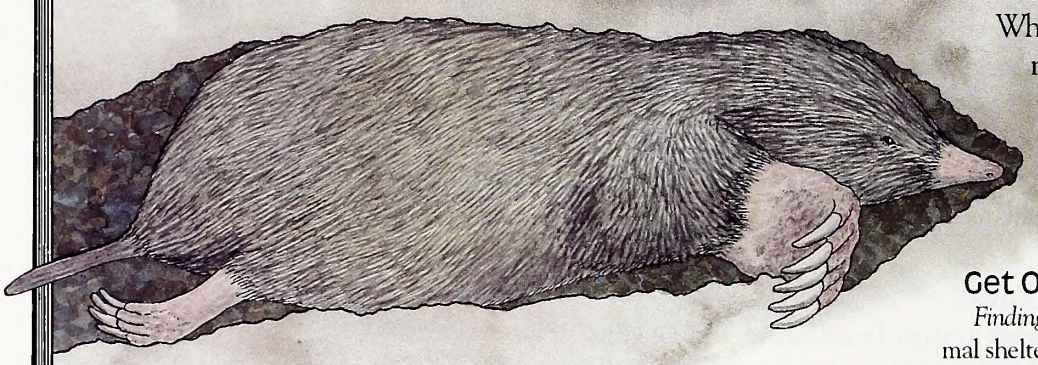
BELOW GROUND

When you walk through a field or forest, you pass over a hidden world. Animals that find shelter underground have advantages. They are unnoticed by hawks, owls and other above-ground predators. And the **subterranean** climate changes slowly, so underground dwellers do not have to cope with very hot or very cold conditions.

Many animals tunnel through the ground. Worms crawl through soil, eating decaying leaves as they go. Moles dig underground highways below the surface, eating earthworms and insects. A mole's highway may lead to a nest where the mole lives by itself or raises its young. Termites build an undergound city that is home to hundreds, thousands or even millions of termites.

A woodchuck digs a long underground tunnel, often 30 or more feet long and 5 feet deep with several rooms off the main passage. A woodchuck climbs above ground during the day to stuff itself with grasses and other plants, but it never roams far from an entrance to its burrow.

Other animals borrow a woodchuck's burrow. Several skunks may hibernate together in an empty room, as do groups of snakes. Opossums, mice and raccoons can make their homes inside a burrow all year. Red foxes enlarge an old woodchuck burrow to make a den. When chased by a predator, a cottontail rabbit might escape underground, staying hidden in a woodchuck burrow until danger passes.



A mole is safe underground.

What Does It Mean?

brush: cut or broken branches; or a thick growth of bushes or shrubs
heartwood: the older, nongrowing center wood of a tree
nest: a shelter that parent animals build to protect their young or their eggs
predator: an animal that hunts other animals for food
prey: an animal that is hunted by another animal
roost: a place for temporary rest or sleep
subterranean: underground

Read and Find Out

- *Animals Among Us: Living With Suburban Wildlife* by Fran Hodgkins, Linnet Books, 2000.
- *Animals: How They Work* by David Burnie, Sterling Publishing Co., 1994.
- *Do Not Disturb: The Mysteries of Animal Hibernation and Sleep* by Margery Facklam, Sierra Club Books, 1989.
- *Secrets of a Wildlife Watcher* by Jim Arnosky, Lothrop, Lee & Shepard, 1983.
- *What Do Animals Do in Winter?* by Melvin and Gilda Berger, Ideals Children's Books, 1995.
- *Who Lives in the Snow?* by Jennifer Berry Jones, Court Wayne Press, 2001.

Get Outside

Finding Shelters: Wherever you live, you can find animal shelters. Look in tall trees for leafy nests built by squirrels. Find holes in the ground dug by chipmunks, woodchucks, moles and others. Stroll through a park and look for thickets and other places a rabbit might hide.

Turn Over a Rotting Log: Be prepared to look fast to find out what animals take shelter there. Many animals hurry away when a log is turned over. Do you see holes in the log that tunneling insects made? Are there animals living under the moist bark? Does a snake or salamander hide under your log? Be sure to turn the log back so that animals can return to their shelter.

Build a Shelter for Wildlife: Consider making a brushpile. Place your pile near shrubs, along the edge of a field or in another place where animals stop and look for food. Make the base of your brush shelter with large logs placed parallel to each other, or use three groups of stones arranged with a space between them. Pile larger limbs on the base, then add smaller branches and twigs on top. Animals will tunnel through the space at the bottom of your brush pile and be hidden by the branches on top. If it snows during winter, check to see if there are animal tracks around your brush pile.

garter snakes

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Everybody Needs a Home teaches students to generalize that people and other animals share a basic need to have a home.

My Kingdom for a Shelter teaches students to identify and describe materials and techniques used by animals to construct shelters.

Get WILD

Advanced WILD Workshops:

Dec. 10-11 – *Black Bears*, Singletary Lake State Park, Bladen County. Contact park office, (910) 669-2928.

Feb. 22-23 – *Bears*, Schiele Museum, Gastonia. Contact Suzanne Simmons, (704) 866-6913.

April 26-27 – *Birds*, PWC Watershed Building, Cumberland County. Contact Kay Bullard, (910) 484-8479.

Editing and design by Consie Powell.

One Shelter, Six Days and How Many Animals?

Six cold December days,
a fierce nor'easter blows
and shakes the cedar tree.

Five red birds huddle,
wrapped in feather down,
safe inside their cedar home.

Four small beetles hide
in the nooks and crannies,
waiting.

Three mantis egg cases,
secured among the needles,
swoop and sway, wild in the wind.

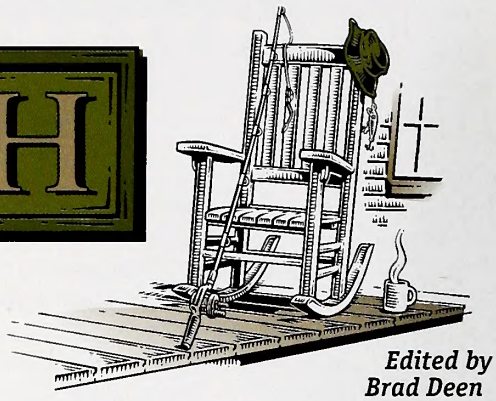
Two tiny toads, cold and slow,
rest among the cedar roots
buried in the soft, cool sand.

One strong cedar tree, a shelter in the storm.

©AMR

BACK PORCH

News and Wildlife Notes



Edited by Brad Deen

WEAKFISH STOCKS COMING BACK

MELISSA McGAW

Once severely overfished, weakfish are completing a dramatic turnaround, according to the N.C. Division of Marine Fisheries' annual stock status report.

"The take-home message here is fisheries management plans work," said Pres Pate, director of marine fisheries. These conservation and recovery plans, which can be intensive, vary by the relative health of each stock. Federal, regional and state agencies jointly manage stocks of migratory species such as weakfish.

Also known as gray trout, weakfish were nearly fished out just a decade ago. The 2001 stock report reclassified the species as viable, citing record-high numbers of spawners and sufficient young maturing to replenish the stock.

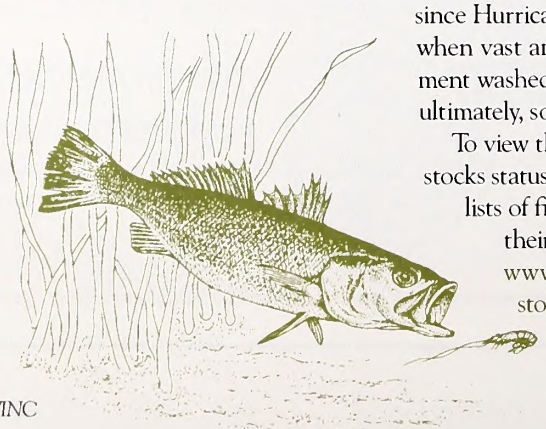
But regulators will not immediately ease weakfish restrictions. "We will maintain the current harvest restrictions for the foreseeable future and gradually lessen restrictions as the stock continues to build," Pate said. "We can't fling the doors wide open and let folks return to the wasteful fishing practices of the past."

Weakfish were the only upgrade in the 2001 report, which includes 40 stocks. Summer flounder, currently on the recovering list, should make the leap to viable next year. Red drum, now classified as overfished, have also shown encouraging signs.

Though some species remain stable, other stocks show signs of problems. Croakers continue to be plentiful in ocean waters but virtually absent from sounds and inside waters, which concerns fisheries managers.

And blue crab harvests have been low since Hurricane Floyd in 1999, when vast amounts of sediment washed into rivers and, ultimately, sounds.

To view the entire 2001 stocks status report, including lists of fish stocks and their status, browse www.ncdmf.net/stocks/index.html.



Watch for Whitetails on the Blacktop

This time of year, even nonhunters should look out for deer.

Each year in the United States, more than 1.5 million vehicle-deer collisions are reported, accounting for more than $1 billion in insurance claims. The danger is especially high in cooler weather, when deer become more active.

Avoiding deer on the roadway is mostly a matter of being careful:

- *Drive the speed limit and be alert.*
- *Mind deer-crossing signs; they're there for a reason.*
- *Be especially watchful during early-evening hours and before sunrise, when deer are most active.*
- *Remember that deer like to congregate. If one crosses the road, another or more will likely follow.*

KEN TAYLOR

But even the most cautious motorist can see a sudden flash of brown or the headlights glinting off round eyes. In that case, remember that staying on the road and hitting a deer is usually better than veering off the road and hitting a tree, a parked car or something else.

On Patrol

'Twas the night before Christmas Eve, and Wildlife Master Officer Charles Hinson got a midnight call from Craven County—not about St. Nick and eight tiny reindeer, but night hunters with visions of whitetails dancing in their heads.

Volunteer firefighters had heard shots in a nearby field. Investigating, they found a late-model pickup with two figures in the back and two in the cab, one shining a spotlight. The chase was on, with the firefighters and, later, Craven County deputies dogging the truck throughout the Turkey Quarter Creek area.

When Hinson arrived in the predawn chill, the suspects' engine had overheated, and all four had run away. Deputies nabbed one poacher at the scene, and another walked back to turn himself in. But the other two—the brother of one and his girlfriend—remained hidden.

JACKIE PITTMAN ILLUSTRATION

The young woman turned up as officers paid an early call on the parents of the two brothers. She walked up the driveway, still smarting from running into a tree in the darkness.

The fourth suspect surrendered that morning, but he spent the rest of Christmas Eve in jail under $1,000 bond.

Three of the poaching party were eventually found guilty of night deer hunting. They lost their hunting licenses and guns and paid fines. The one who returned to the scene and gave up pleaded guilty to a lesser charge and was not sentenced, provided he stays out of trouble.

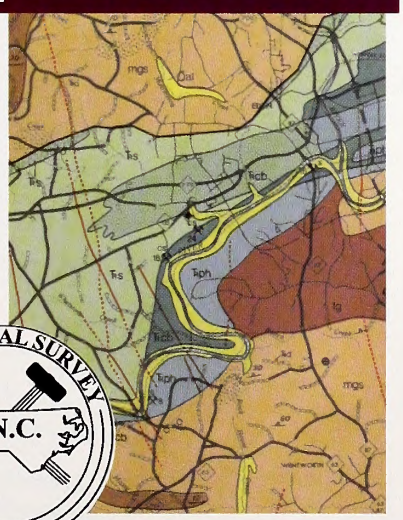
All four surely made Santa's "naughty" list.

State Geological Maps for Sale Online

Got maps? *The Geological Survey Shop does—and they're just a click away.*

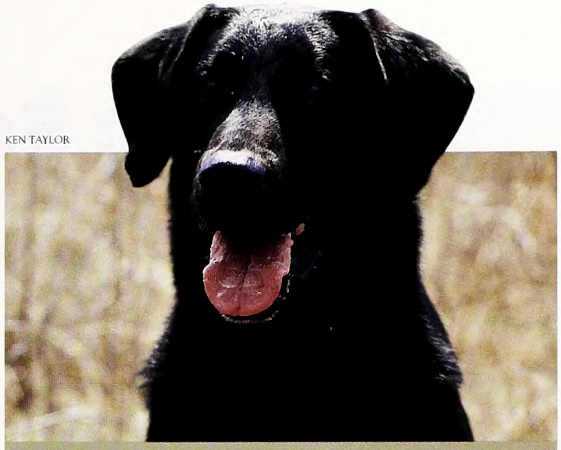
The N.C. Geological Survey has launched an e-commerce site selling topographic and geological maps. Other popular products include guides to state parks and the Blue Ridge Parkway, plus publications on gold, fossils and minerals to be found in North Carolina.

Future expansion plans for the Web site will make 2,000 of its publications—including county and smaller-area topographic maps—available online.



www.store.yahoo.net/nc-maps

KEN TAYLOR

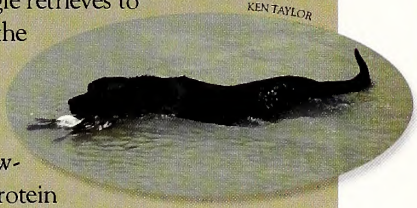


Keep Rover Ready for Duck Season

- Begin slowly, and try to practice early in the morning or in the evening.
- Have plenty of water available, and don't drill for long periods with an out-of-shape dog.
- Reinforce all basic commands such as "sit," "stay," "here," "over" and "back."
- Don't force experienced dogs to fetch bumpers if they lose interest after a toss or two. It's not the real thing, and they know it.
- Work extra hard on blind retrieves rather than simply throwing and fetching.
- Move from single retrieves to multiples during the tune-up process.
- Change your dog's diet gradually from low-protein to high-protein food if the dog is going to be working hard.
- Spend as much time with your dog as possible. Let it ride with you to the post office, bank or other short trips.
- If your dog is to be a multipurpose retriever, get some pen-raised quail or pheasants, or some pigeons and a bird launcher, and work the dog upwind into the birds.
- Always give lots of praise for a job well done.

—Ducks Unlimited

KEN TAYLOR

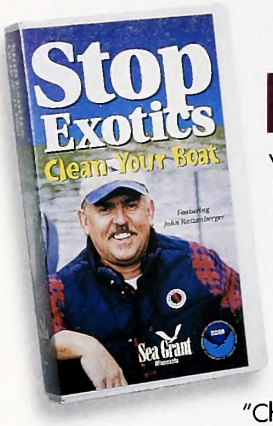


Wildlife Endowment Fund Report

Fund Balance $44,873,546.58

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to Wildlife in North Carolina *magazine, as well as from tax-deductible contributions. Although the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.*

Clean Boats, Cleaner Waters



It's a little-known fact, as "Cheers" mailman Cliff Clavin would say, that recreational boaters can spread hydrilla and other non-native, nuisance species. A new video aims to make that fact better known.

"Stop Exotics: Clean Your Boat" stars John Ratzenberger, the actor who portrayed the "Cheers" know-it-all, demonstrating what boaters can do to prevent spreading plants and animals from one water body into another. In short:

- *Pick clinging plants off boat, trailer and other gear after loading.*
- *Drain live wells and ballast tanks.*
- *Dispose of unused live bait on shore.*
- *Rinse boat, trailer and gear, preferably with high-pressure hot water.*
- *Dry everything at least five days.*
- *For personal watercraft, clear the jet by running the engine a few seconds after the craft is trailered and out of water.*

Often called "biological garbage," non-native aquatic plants and animals can create massive ecological problems. Freed from their natural enemies, these species can multiply rapidly. They compete with and sometimes displace native species.

Although several dozen exotic plants and animals are creating problems across the U.S., the video concentrates on zebra mussels, Eurasian watermilfoil and, of course, the Asian water weed hydrilla, which has rampaged into many of North Carolina's freshwater lakes.

The 11-minute video was produced by Minnesota Sea Grant and a slew of federal and state agencies. It is intended mostly for showing at marinas, visitor centers, boater courses and environmental education centers. For a copy ($10 each or $8 bulk) or more information, call (218) 726-6191 or log onto www.seagrant.umn.edu.

Poisoning Water to Save Trout

DUANE RAVER

Brook trout may get more living space in the Great Smoky Mountains, but at another species' expense.

Brookies, the only trout species native to the Smokies, are losing habitat to the rainbow trout, which was introduced to eastern mountain streams. The bigger, more aggressive rainbow has already captured low- and middle-elevation waters, leaving higher-elevation streams to the native brook trout.

But acid rain is polluting those headwaters. Steadily losing habitat, brookies—also known as speckled trout or specks—are in danger of becoming endangered.

To create more space for the native trout, the U.S. National Park Service in October cleared out rainbows from a 2-mile stretch of Sams Creek, located on the North Carolina-Tennessee border. After catching and removing the brookies, park crews dropped the antibiotic antimycin into the water, killing the remaining fish. A neutralizer added to waters at the bottom of the project area prevented fish kills downstream.

The doses should not affect other wildlife or humans, although the creek was closed to visitors temporarily. Park managers also waited until the caddisfly's mating season, when it leaves the water, to make sure the rare insect was not harmed.

If the Sams Creek project is successful, the Park Service hopes to restore brook trout habitat to another 40 miles of the park's 2,000 miles of streams.

Wildlife through the Year

The Winter Blues

KEN TAYLOR

Many bluebirds can be seen in North Carolina during winter. And bluebirds are becoming more common in backyards as more people provide year-round food, fresh water and a good nestbox for their use.

To attract bluebirds to your backyard, you need a feeder filled with what bluebird enthusiasts call "winter pudding." Bluebird beaks are not designed to eat sunflower and other seeds. Instead, the birds eat insects, berries and man-made food mixes. They can best be fed by making a feeder with see-through sides and with 1 1/2-inch holes at each end. The sides can be left open at the start to get the birds familiar with the feeding station. Dogwood berries and mealworms, which can be purchased locally, also attract bluebirds.

— Chris Powell

Winter Pudding

2 quarts water
4 cups grits (nat instant)
raisins and peanuts (optianal)
1 cup margarine
1 cup peanut butter

In a large saucepan, bring water and margarine to a boil. Slowly add grits, stirring and cooking until mixture begins to thicken. Remove from heat and add peanut butter, raisins and other ingredients. Mix well, then place in feeders. Freeze the balance in shallow plastic or foil containers for future use.

Calendar of Events

Saturday-Monday, Dec. 1-3

Celebrate the return of migratory tundra swans at the Swan Days Festival at Lake Mattamuskeet. Call the Hyde County Chamber of Commerce, (888) 493-3826.

Friday-Sunday, Dec. 7-9

The Core Sound Waterfowl Weekend and Decoy Festival is on Harkers Island. Call (252) 728-1500, or e-mail amspacher@bmd.clis.com.

Saturday, Dec. 15

Help count winter birds at the Pisgah Center for Wildlife Education from 8:30 to 10:30 a.m. Dress for outdoors and bring binoculars. Call (828) 877-4423.

Dolphin Deaths Come Under Scrutiny

North Carolina's record on bottlenose dolphin deaths may force a federal panel to take a hard look at commercial fishing gear, including gill nets and crab pots.

The 44-member Bottlenose Dolphin Take Reduction Team—consisting of commercial fishermen, environmentalists and scientists—was created by the National Marine Fisheries Service to recommend ways to reduce dolphin kills along the Atlantic coast. Possibilities range from equipment modifications to seasonal restrictions.

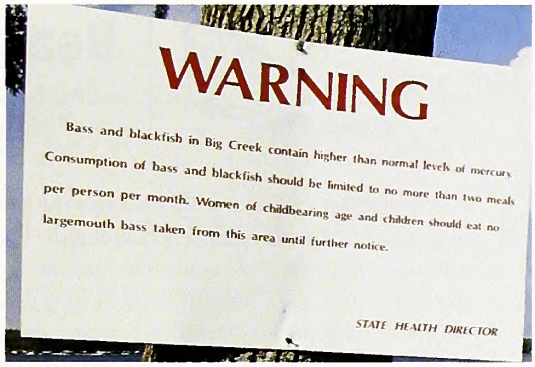
Gill nets are the most controversial item on the list. Anchored at the bottom, the nets can entangle dolphins and drown them.

The Marine Fisheries Service has estimated that gill nets trap 894 dolphins each year from New Jersey to North Carolina. Those figures are undergoing re-evaluation because of fishing industry complaints.

The Marine Mammal Stranding Network, based at UNC-Wilmington, says about 150 bottlenose dolphins are found dead along the North Carolina coast each year.

JIM BROWN ILLUSTRATION

The state's crabbers also worry that their traps will come under scrutiny because of their sheer numbers—in the hundreds of thousands. Yet crabbers argue that dolphins rarely, if ever, die in crab pots because the wire openings are too small.



MELISSA McGAW

Children, Women: Eat Fish with Care

Because of high mercury levels in some fish, two federal agencies—the Environmental Protection Agency and the Food and Drug Administration—have advised caution. Mercury, a metal, has been linked to developmental disorders in children. Women who are nursing or pregnant, or who could become pregnant can pass mercury to their babies.

The N. C. Department of Health and Human Services urges these guidelines for children age 15 or younger and women of childbearing years:

- Do not eat saltwater fish high in methyl mercury—shark, swordfish, tilefish and king mackerel. The same warning applies to some freshwater fish species caught in certain North Carolina waters south and east of Interstate 85—blackfish (bowfin), largemouth bass or jackfish (chain pickerel).
- Eat one or two meals per week of fish low in methyl mercury—farm-raised fish, canned fish such as tuna, fish sticks, shrimp, crab, lobster, clams, oysters, scallops, salmon, trout, cod, whitefish, pollock, mahimahi, ocean perch, halibut, haddock, flounder, croaker, herring, crappie, sunfish, white perch, yellow perch and bream.

Other women, men and children older than 15 should eat no more than one meal per week of the fish high in methyl mercury, and up to four meals per week of other fish.

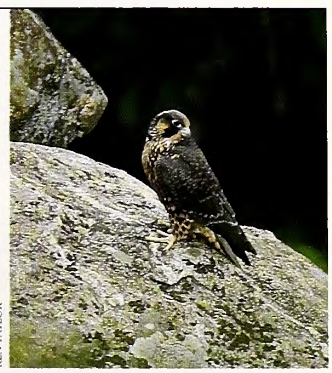
For fish advisories, go online to **www.schs.state.nc.us/epi/fish/current.html**.

Wildlife Commission Safeguards Peregrine Nests

The world's swiftest bird, the peregrine falcon is making a slow but steady recovery in western North Carolina.

The N.C. Wildlife Resources Commission, working with other agencies and volunteers, this year identified 10 territorial pairs of the rare raptor. Seven pairs successfully fledged at least one chick. As recently as 1984, the species was all but extinct in the state, with only four individuals alive in the wild.

Habitat protection is key to the peregrine falcon's comeback. The power-diving bird of prey, which can reach speeds up to 200 mph, nests in cliffsides and rocky outcroppings. To prevent rock climbers from unwittingly disturbing a nest, the Wildlife Commission conveyed restrictions near the aeries to rock-climbing organizations. Updates on climbing restrictions and the birds themselves became regular features on the Web sites of several climbing groups.



KEN TAYLOR

Nature's Ways

Bearing Down

written by Brad Deen
illustrated by David Williams

Think of hibernation, and you'll probably think of a bear, its internal alarm set for spring, snoring contentedly inside a cozy cave. But in these parts, bears don't really hibernate. In fact, they spend far less time tucked into their dens than other long winter's nappers do.

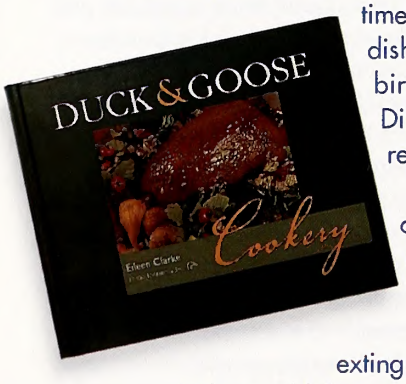
Unlike true hibernators—reptiles, bats and many rodents—bears merely snooze through winter in a state known as dormancy. They wake. They stir. They amble outside. Females give birth during their winter lethargy. What they don't do is eat or drink or even excrete.

The duration of ursine dormancy varies by species, climate and individual. Northern brown bears bed down as early as September. North Carolina's only native bear species, the black bear (*Ursus americanus*), typically dens by mid-December, up to a month later than skunks, groundhogs and other seasonal sleepers. But black bears in the deeper South, from Florida to Louisiana, can remain active through a mild winter.

March is usually when black bears emerge. Having lost as much as half their body weight, they are hungry, but not intemperate. Water comes first, then grasses and herbs to revive cobwebbed kidneys. When the spring berries burst forth, bears resume their annual business of fattening up for the following winter.

Book Review: Duck & Goose Cookery

Duck & Goose Cookery serves up something deliciously different. Eileen Clarke, a contributing editor to *Field & Stream* and author of five previous game and fish cookbooks, focuses on waterfowl this time. She offers 100 kitchen- and camp-tested dishes—from appetizers and soups to roasted birds, smoked birds, sausages and jerkies. Directions are clear, and the ingredients are readily available.



Also helpful is a section on plucking, processing, aging and storing freshly killed ducks and geese. And sprinkled throughout the book are tips ranging from how to tell when a bird is done to avoiding and extinguishing fat fires.

What could distract readers is the placement of color photos, which are grouped together instead of facing their corresponding recipes. And although each photo lists a recipe page number, the recipes themselves do not refer to photo pages.

Still, the book should delight and inspire anyone tired of waterfowl recipes that call for a can of cream of mushroom soup.

Duck & Goose Cookery *by Eileen Clarke, Willow Creek Press, 156 pages, hardback 2001, $27.50, available in bookstores or direct from Ducks Unlimited, (800) 45-DUCKS, or www.ducks.org/bookstore/.*

While Supplies Last

2002 NORTH CAROLINA WILDLIFE CALENDAR

A perennial best seller, our Wildlife Calendar features paintings by 12 talented artists who have depicted an array of North Carolina's wildlife and wild places. They make great gifts for the wildlife enthusiasts on your list.

Calendars are $6 each plus tax (less for bulk sales). Allow three weeks for delivery, so order now in time for Christmas. Call (919) 662-4377, or go online to **www.ncwildlife.org**. Calendars are also available during business hours at the N.C. Wildlife Resources Commission sales office, 322 Chapanoke Road in Raleigh.

Catch Us at these Numbers

1-800-662-7137 to report violations of hunting and fishing laws

1-800-628-3773 (NC VESSEL) for boat registration and titling

1-800-675-0263 for hunting dates and shooting hours for migratory game birds

1-888-248-6834 (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone

1-800-446-8663 (I GOT ONE) to report big game harvests

Connect to the Commission's online Web site at **www.ncwildlife.org**.

Calls are answered in order, but some numbers may require a wait during busy seasons.

N.C. WILD STORE

NEXT

in our "Sporting Heritage" poster series...

SPORTING DOGS OF NORTH CAROLINA
Trailing and Treeing Breeds

The plaintive howls of dogs hot on the scent of game—that's music to a hunter's ear. North Carolinians have valued their trailing dogs since the first English foxhounds came to the colonies in the late 1700s. Our second sporting dogs poster depicts a dozen trailing breeds—from the pint-sized feist to the regal redbone—in beautiful color. Learn their histories from the descriptions that accompany the photographs, and find out which ones tree their quarry as well. This poster includes the Plott hound, North Carolina's state dog. Poster size: 22" x 34".

$10 ITEM CODE P21

See page 38 for our Pointing and Retrieving Breeds poster.

YOUR PURCHASE SUPPORTS THE DEVELOPMENT OF CONSERVATION EDUCATION PROJECTS AND PROGRAMS IN NORTH CAROLINA.

Order this item and all N.C. WILD Store products online at: www.ncwildlife.org

◀ Salamanders of North Carolina

Explore the hidden world of some of North Carolina's most unique creatures. This poster both educates and captivates with color photographs of the 13 salamander species in North Carolina that have lungs or gills. Habitat and life cycle notes for each species accompany the illustrations (24" x 36").

$6 ITEM CODE **P19**

▲ Butterflies Poster Set

A brilliant selection of 17 rare and 19 common butterflies adorn these two posters. Range maps and informational text highlight the connections between the butterflies and their habitats. Posters are 22" x 34".

$14 ITEM CODE **P17**

Each poster can also be purchased individually:

Common Butterflies of North Carolina

$8 ITEM CODE **P15**

Rare Butterflies of North Carolina

$8 ITEM CODE **P16**

▶ Amphibians: Frogs of North Carolina Poster Set

Set of two posters in full color: The Hylid Frogs and True Frogs & Toads. These two posters in the Amphibians series showcase North Carolina frogs. Vibrant photos and informative text combine to make these posters stand out in the home or classroom (22" x 34").

$10 ITEM CODE **P20**

Each poster can also be purchased individually:

Amphibians: The Hylid Frogs

$6 ITEM CODE **P11**

Amphibians: True Frogs & Toads

$6 ITEM CODE **P14**

Gardens for Butterflies

An 8-page guide to creating your own garden for attracting butterflies. **FREE** with each poster set (**P17**). Guide is also sold separately.

$2 ITEM CODE **M5**

◀ Sporting Dogs of North Carolina

Pointing & Retrieving Breeds. This poster features 12 breeds that point or flush and retrieve birds. Each striking color portrait includes a description of the breed's habits and history. (22" x 34")

$10 ITEM CODE **P18**

Sporting Dogs Poster Set. Buy both posters and save: Pointing & Retrieving and Trailing & Treeing Breeds (featured on page 37).

New

$16 ITEM CODE **P22**

▲ Sporting Heritage Posters

These sporting heritage posters preserve two treasured traditions. Each poster is 22" x 34".

Waterfowl Decoys of North Carolina

Descriptions of classic decoys made during the heyday of waterfowl hunting complement 19 color photographs. $10 ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Color photographs of 16 trout flies accompany brief histories and detailed descriptions. $10 ITEM CODE **P13**

While Supplies Last

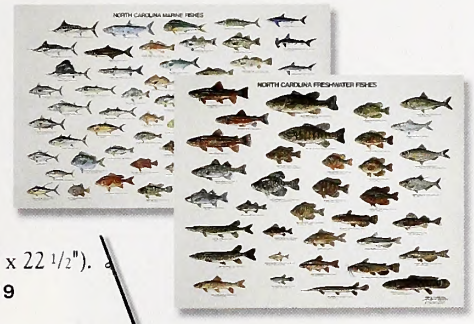
Reptiles of North Carolina ▶

Autumn Year-end Special.

Lizards, turtles and snakes—oh my! Learn to revere them rather than fear them. This set of three reptile posters features over 60 species found in North Carolina and notes those that are endangered, threatened or of special concern. Each poster is 22" x 34".

$10 ITEM CODE **P10-S**

Fishes of North Carolina ▶



Reel 'em in! This two-poster set depicts colorful paintings by Duane Raver of 36 freshwater species (28" x 22 1/2") and 60 marine species (35" x 22 1/2").

$10 ITEM CODE **P9**

Pisgah Center for Wildlife Education T-shirts ▼

100% cotton beige tee with colorful design on back and Pisgah logo on front. Adult sizes.

$14.50 ITEM CODES:

A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

Wee Tees

Just like the adult shirt, only smaller.

ITEM CODES:

A9XS (extra small; size 2-4) $10
A9SM (small; size 6-8) $12.50
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50

◀ Sporting Heritage T-shirt

This all-cotton tee spotlights bass-fishing traditions with a Duane Raver painting of a largemouth at Atkinson's Mill in Johnston County. The sporting heritage logo on the front complements the distinctive scene on the back. Adult sizes only.

$14.50 ITEM CODES:

A12MED (medium)
A12LRG (large)
A12XLG (extra large)
A12XXL (extra extra large)

Items not pictured:

All Things Are Connected

Video and Activity Guide. Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by *This Land Is Sacred* teacher's guide, this film is a must-see for everyone.

$22 ITEM CODE **W3**

Wildlife Babies Video

Classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others.

$20 ITEM CODE **N9**

North Carolina Trout Fishing Maps

Find your dream stream. Covering trout streams in 25 western North Carolina counties, the atlas-format booklet provides information and regulations for each stream. Each map depicts game land boundaries, federal lands and state parks, as well as major roads and towns.

$12 ITEM CODE **TMAP**

Bird Houses and Feeders

This 8-page illustrated guide to building birdhouses includes construction notes and dimensions, as well as tips for turning household objects into ready-made feeders and homes.

$2 ITEM CODE **M6**

Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder.

$10 ITEM CODE **M2**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. $3 each

Cub & Boy Scout Correlation ITEM CODE **E9**
Girl Scout Correlation ITEM CODE **E10**

Embroidered Caps

Wildlife in North Carolina Caps ▶

Exclusive designs and magazine logo are featured on four different cap styles.

$16.50 each

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE **A11**
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

◀ **N.C. WILD Caps.** N.C. WILD and cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure.

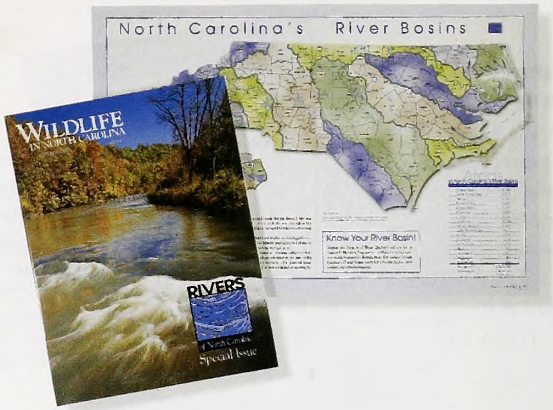
$16.50 each

- Tan cap with forest green bill. ITEM CODE **A1**
- Tan cap with burgundy bill. ITEM CODE **A10**

Rivers of North Carolina ▶

In this 128-page special issue of *Wildlife in North Carolina*, the state's finest outdoor writers and photographers explore North Carolina's 17 river basins. Eye-catching photographs, informative maps and unique graphics make this special issue a work of enduring excellence. Buy this classic for your own bookshelf, or give it to friends and family members to enjoy for years to come.

$10 ITEM CODE **M11**

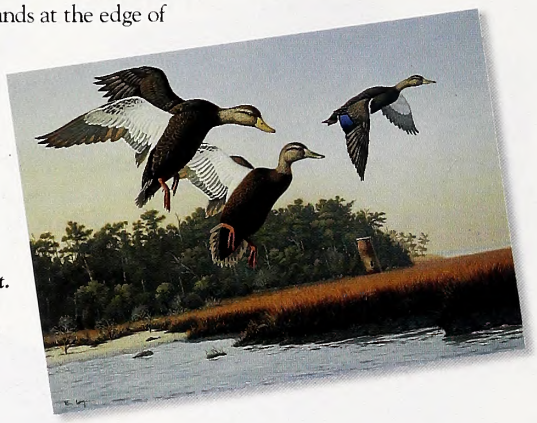


2001 Migratory Waterfowl Print and Stamp Set ▼

Black ducks take wing over an estuarine marsh on the lower Cape Fear; Price's Creek Lighthouse stands at the edge of the woods, as it has since 1849. This year's limited edition print, signed by artist Ron Louque, combines waterfowl heritage and N.C. history. Your purchase will support wetland restoration and waterfowl research. Overall size is 12" x 14"; image size 6 1/2" x 9".

This item not subject to 15% discount.

$145 ITEM CODE **DSP01**



Dogs that Point, Fish that Bite ▼

Sample 50 of Jim Dean's best essays for *Wildlife in North Carolina* magazine.

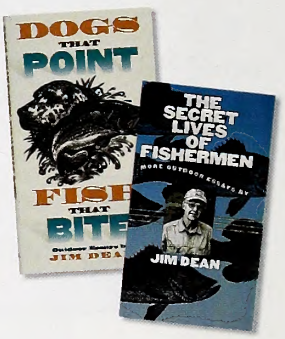
Hardbound $19.95
ITEM CODE **M8**

Paperback $10.95
ITEM CODE **M12**

The Secret Lives of Fishermen ▶

More of Jim Dean's well-hone observations on hunting, fishir and the country life.

Hardbound $24.95
ITEM CODE **M13**



North Carolina WILD Places: A Closer Look ▶

Book and Posters Set.

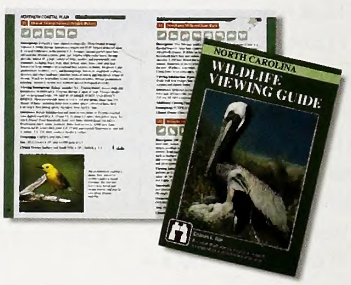
Explore the diversity of the state's natural communities. This soft-cover book describes 13 habitats across the state with illustrations by Anne Marshall Runyon. A folding pair of habitat posters by Runyon and a N.C. WILD Places map featuring the art of Jackie Pittman make this set a valuable teaching tool.

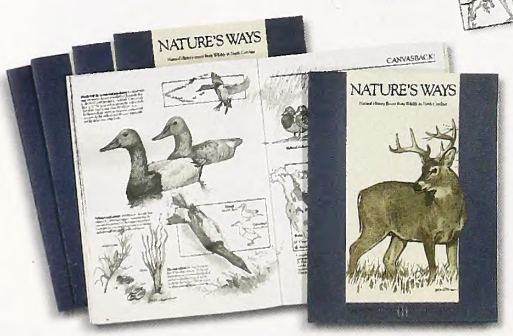
$16 ITEM CODE **E6**

North Carolina Wildlife Viewing Guide ▼

From Cape Hatteras to the Great Smokies, the *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there.

$5.95 ITEM CODE **N6**





Nature's Ways Collection ▲

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set.

Boxed set. $30 ITEM CODE **M10**

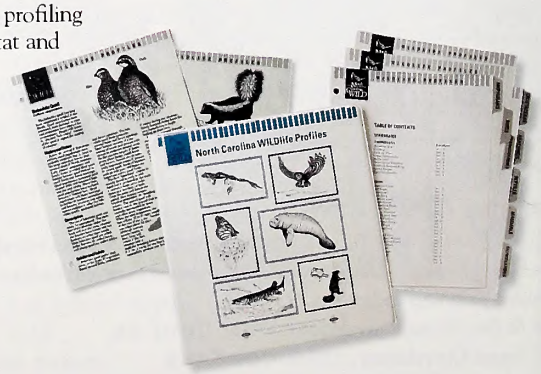
Unboxed set. $27.50 ITEM CODE **M9**

N.C. Wildlife Profiles Binder & N.C. Wildlife Profiles Sets 1-12 ▼

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30 ITEM CODE **W17**



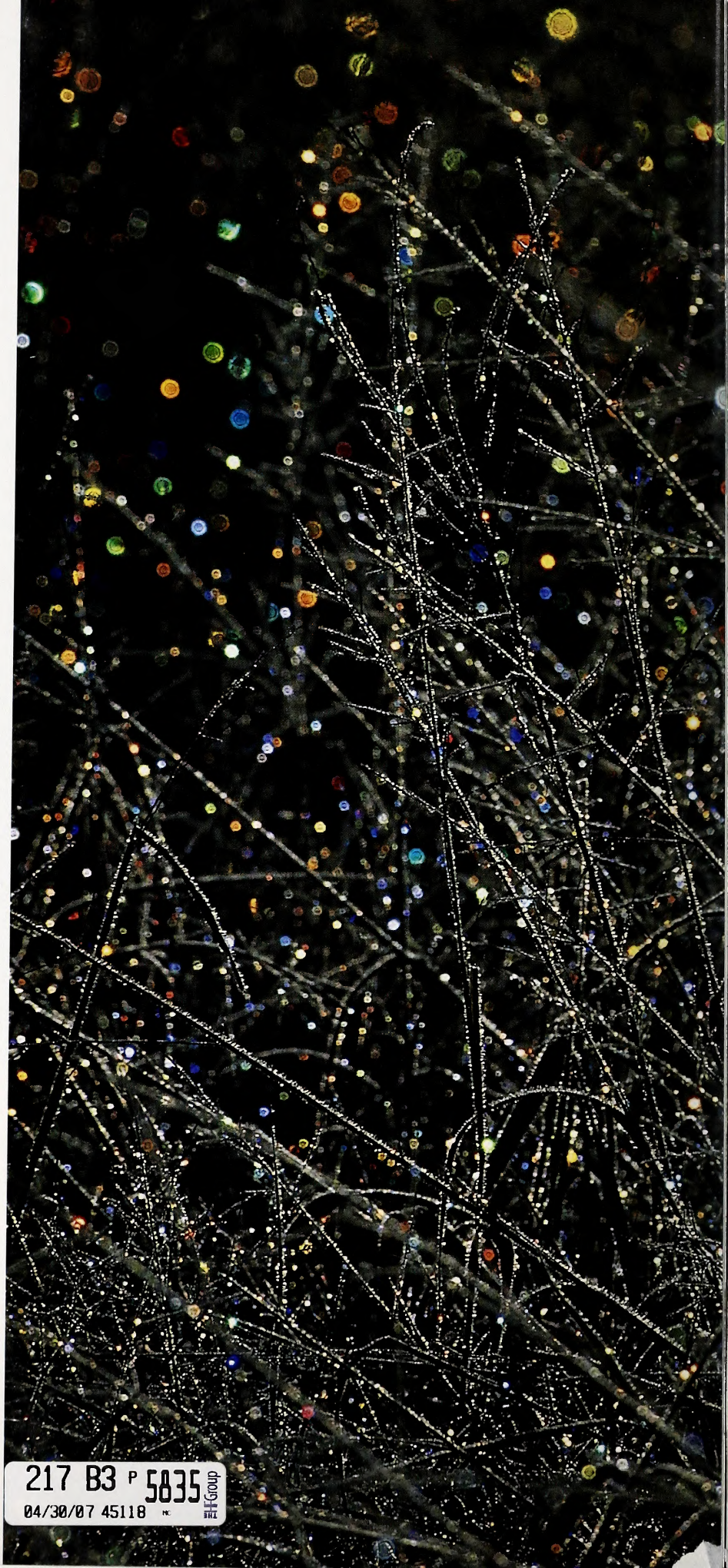
DERRICK HAMRICK

A Little Something Under the Tree

Season's Greetings

from the staff of

WILDLIFE
IN NORTH CAROLINA



Nature's Christmas Lights

Sunlight and frost crystals create a dazzling display on grass in a wintry field.

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